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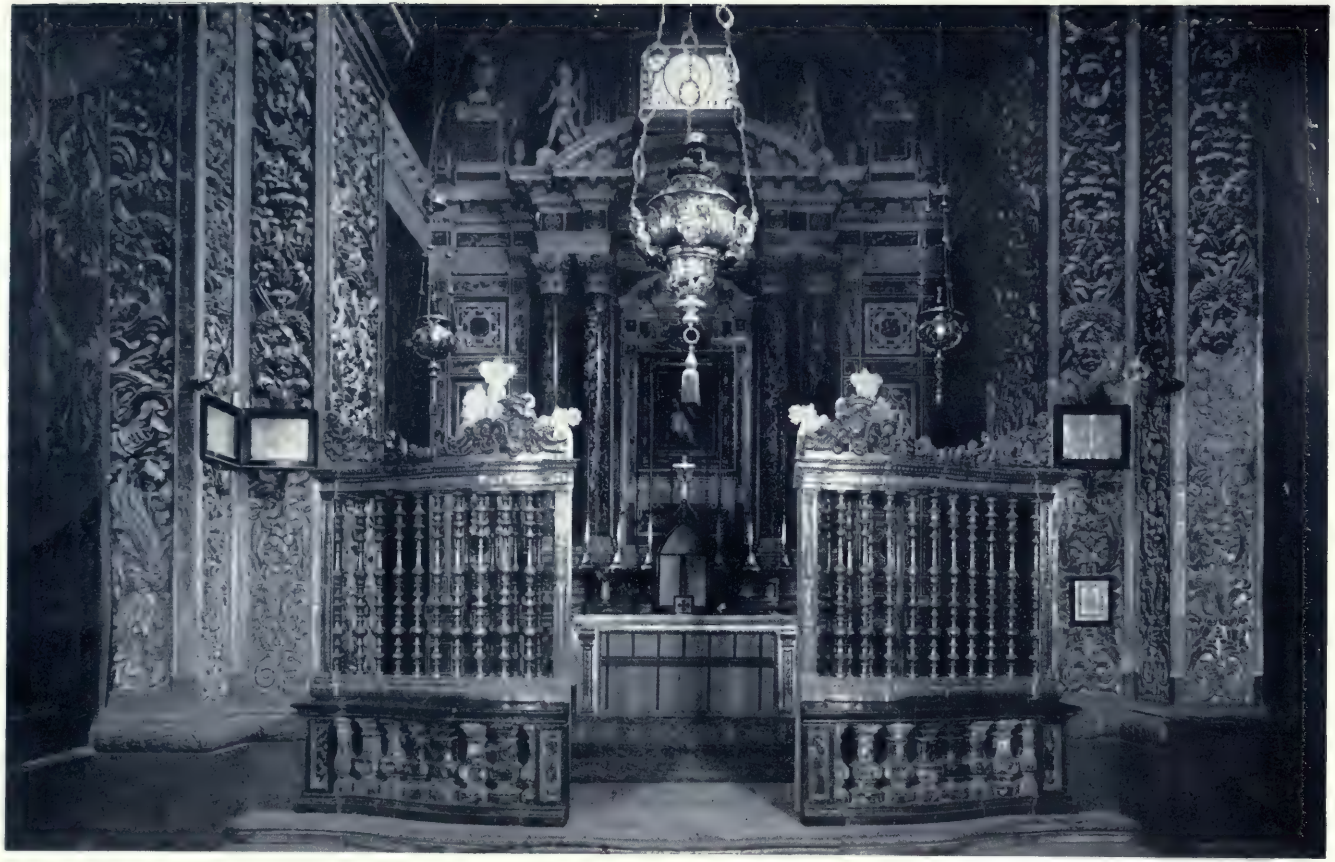
SILVER

ITS HISTORY AND ROMANCE



SCREEN IN THE SACRAMENTAL CHAPEL, S. JOHN'S CHURCH, MALTA. *(Frontispiece.)*

SILVER

ITS HISTORY AND ROMANCE

BY

BENJAMIN WHITE

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DEDICATED BY THE AUTHOR TO HIS WIFE IN GRATEFUL RECOGNITION OF HER WORTH. THE HEART OF HER HUSBAND DOTH SAFELY TRUST IN HER. SHE WILL DO HIM GOOD AND NOT EVIL ALL THE DAYS OF HER LIFE. SHE OPENETH HER MOUTH WITH WISDOM AND IN HER TONGUE IS THE LAW OF KINDNESS.

INTRODUCTION

BY

SIR CHARLES ADDIS

It is a common observation that we really know very little of the things with which we are most familiar. This book is written to remove the reproach as regards one of them.

It is not given to everyone to be born with a silver spoon in his mouth, but from infancy to old age silver has entered into the life of man and has profoundly affected his destiny. The ultimate origin of the word is shrouded in the mists of antiquity. We do not know whether silver was first desired for its beauty or its use. We cannot tell at what period it passed into money. What we can assert with confidence is that at an early stage in the history of mankind silver came into use as a medium of exchange, and in the whole course of a long uphill march of civilisation no step more momentous or more pregnant with consequence to the human race was ever taken than the advance from a state of barter to a money economy.

Originally, silver passed from hand to hand by weight, as when Abraham weighed to Ephron four hundred shekels of silver, 'current money with the merchant,' as the price of the field and cave in Machpelah. It passes by weight in China to this day.

At a later stage it was found convenient to cast the silver in the form of rods from which pieces of a size appropriate to the value of the payment desired could easily be cut. The weight or value of each piece having thus been established for a single transaction, this led by

a natural transition to recording the weight of each piece of silver by a stamp or punch on its obverse or reverse, so as to make it available for any similar operation in future without the necessity of re-weighing it on every fresh occasion of exchange. The effect of the blow struck by the punch or stamp was to flatten the piece of metal into a rounded form, as in the case of the *tical* of Siam, and to this no doubt may be ascribed the circular form which our modern coinage has practically universally assumed.

With the advent of silver as a coin we pass into the realm of currency. The two metals, silver and gold, have been used in varying proportions as a medium of exchange, and have circulated side by side from the earliest time. At the close of the eighteenth century the use of silver was predominant, and it is still the chief form of money in India, and the standard of value in China. With the evolution of modern industry and the improvement in communications, the place of silver has been eclipsed by the superior convenience and economy of gold as a medium of international exchange.

And here upon the threshold of the debatable question of the effect on international prices to which the alternative use of silver and gold as the standard of value gives rise, the author takes leave of his subject, to return to it, we shall hope, on some future occasion. In this preliminary survey of the history and romance of silver, the general reader will find Mr. White a competent and entertaining guide. If the reader is tempted, as he probably will be, to pursue the subject further, he will find that the perusal of this book has supplied him with a useful introduction to the study of the theory of money.

C. S. A.

PREFACE

My attention has been drawn to the fact that no modern writer has taken silver for his subject as to its history, mining, refining, its use for manufacture and currency, and its markets. At the instance of Mr. K. Mogami, one of the managers of the Yokohama Specie Bank, I entertained the idea of writing such a work.

My earliest years have been associated with the metal —a silver mug was presented at my christening, and my infant troubles were soothed with a coral attached to a silver ring. My father carried on a business, embracing the design, engraving, and chasing of silver articles, and recollections of my childhood linger lovingly around the beautiful objects connected with what was then a highly artistic occupation. Now, alas! the use of machinery for the multiple reproduction of stock patterns has vulgarised the public taste, and comparatively few are willing to pay the price for craftsmanship of the highest class. An illustration, provided by the courtesy of Messrs. D. and J. Wellby, Ltd., the well-known jewellers and silversmiths, portrays my father's late foreman, Mr. Charles Mitchell, now in their employ, engaged at his bench. Before I had completed my teens, my Sovereign presented me with a silver medal and bars for services rendered in the Egyptian wars of 1882 and 1884. In the latter year I entered the courts of the temple of silver—the London Market—and for over thirty-two years have paid my devotions at its shrine.

The reader will pardon this personal note when informed that it is intended as an apology for entering upon so venturesome a task as to compose a book. It is my sincere hope that no reader will lay it down with the caustic comment that I have rushed in where angels feared to tread.

The inception and execution of this work are entirely mine, and the responsibility for all statements, which, in so embracing a subject, may possibly become the subject of some criticism, rests upon me alone.

An attempt has been made to combine entertainment with useful information. For this reason the use of technical terms is avoided as much as possible, and a freedom of language is employed without hesitation whenever an opportunity occurs of stirring the imagination.

It would afford me special pleasure should this volume find a way into schools, either as a prize or a text-book, for it is a great privilege to be the means of imparting useful knowledge to a succeeding generation. The subject-matter lends itself to such a purpose, touching as it does the daily life of mankind from the earliest ages, taking in its sweep geography, history, meteorology, geology, and many another '-ology' besides. Everything is welcome that encourages the youthful mind to think. A London schoolmaster happened to note an annual bullion circular letter lying upon a friend's table, and remarked: 'This looks interesting, can I borrow it?' A week after he returned it and said, 'I have taught my class from this during the week, how can I continue the study?' Each week since he has received a bullion letter for the purpose.

It is hoped that this work will reach the inhabitants of India, China, and Japan, where the English language is becoming well known, and where commercial business is influenced so largely by the price of silver. At the time

of writing, China is the only country of first-class importance whose currency system rests upon silver alone. This fact affects the trade of all who deal with China, especially that of its nearest neighbours. The absorption of silver by India and China for currency and trade embraces the greater portion of the world's output, and, for that reason, considerable space has been devoted to the relations of these countries with the metal.

Finally, it is desired that the man in the street should be induced to leave the common highway, and lose himself for a while in the wider fields of thought suggested by the story of silver, which, from the earliest ages, teems with romance.

Should the reader ever visit the great museums with the object of pursuing one line of study (as I have done with regard to silver) he will find the exhibits no longer dry bones, but instinct with life. The writer overheard some East End lads lamenting the lack of a catalogue to explain the treasures of the British Museum. When invited to search the cases for silver objects, they spent a very lively hour indeed, and expressed great gratitude for the suggestion.

The subject touches us all, for the common speech of daily life abounds with references to silver. It has been wittily remarked that it may be considered to possess the remarkable property of belonging to all three kingdoms, mineral, animal, and vegetable. The ordinary silver of commerce represents the mineral kingdom. The birch and silver fern may be taken to represent the vegetable kingdom. The 'silver stick' really places the metal in both the animal and vegetable kingdoms, for the name of the staff carried by the field-officer-in-waiting upon the Sovereign is more frequently applied to the gentleman himself than to the wand he bears. That portion of an ox known as the silver side of beef places silver beyond cavil within the

animal kingdom, and provides a savoury dish for a large number of mankind. Silver tongues, exquisite to listen to, but, alas, too rare! belong also to this kingdom, as well as silver fish and silver foxes. Silver is found in positions which render the assignment of any kingdom at all difficult, unless the heavenly be selected. Such are silver linings to clouds, and the ever-changing radiant silver moon.

I desire to express my thanks to many kind friends who have afforded me valuable aid, to the Institution of Metals and Metallurgy for the use of its library, to the proprietors of *The Daily Telegraph*, *The Financial Times*, and *The Pall Mall Gazette*, who have been good enough to give me permission to adapt and use material which I had written for their columns. I am much indebted for their courteous attention to Sir T. K. Rose, D.Sc., of the Royal Mint, and Mr. W. W. Watts, F.S.A., of the Science and Arts Museum, South Kensington.

My deep obligations to the managers of the great Anglo-Eastern banks must be acknowledged, not only for the photographs which they arranged to have taken for the purpose of illustrating this work, but also for their having been the means, perhaps unconsciously, of furnishing me with that general knowledge of the great Eastern countries which has given me courage to write freely concerning their currency and industrial consumption.

It has been necessary to traverse unfamiliar ground so as to obtain a comprehensive view of the subject treated in the following pages. So constant and heavy has been the pressure of business duties, that time, energy, and inclination have been lacking to embark upon that amount of study which might have been a safeguard against mistakes as to technical details touched upon outside my ken. Perhaps the reader may be good enough to bear this in mind when his superior knowledge detects an error.

Among the works used for the purpose of reference are the following :

The Annual Report of the United States Director of the Mint, which is *par excellence* the standard authority upon the precious metals.

Ore Deposits. Phillips and Louis.

Terry's *Mexico.*

The Trade and Administration of China. H. B. Morse.

Mexican Antiquities. Joyce.

History of Japan. Brinkley.

Historia Numorum. Barclay V. Head.

Paper read before the Japan Society. W. Gowland.

Old English Plate. Cripps.

Indian Art at Delhi. Sir George Watt.

Booklets issued from time to time by the First National Bank, Boston, U.S.A.

The Handbooks of the British Museum.

The Translation of Agricola. By H. C. Hoover, to whom my special thanks are due for the handsome permission to use his valuable footnotes without specifically mentioning my obligation.

Official Reports of the Bureau of Mines, Canada.

Greece under the Romans. G. Finlay.

Romance of Modern Mining. A. Williams.

Story of British Coinage. G. B. Rawlings.

If any works, that should have been mentioned, have been omitted from the above list by inadvertence, my sincere apologies are offered.

BENJAMIN WHITE.

June, 1917.

PREFACE TO SECOND EDITION

THE reception of the first edition exceeded my utmost anticipation, and the hope that the volume might be useful in Japan was amply realized, nearly a third being furnished to that country. I have had the pleasure of presenting copies of this work to the libraries of native colleges and schools in the capitals of the chief British Dependencies (Khartoum, Mombasa, Hong Kong, etc.).

Several readers have been so good as to write me letters correcting small errors and adding information, some of which is embodied in this revision. Should any of my new readers be able to give me assistance of this character, I should be very grateful, as I am anxious for this work to be as useful and authoritative as possible.

B.W.

January, 1920.

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OUR FAIR ANCESTRESS.

(p. 1.)

CHAPTER I.

THE GENESIS OF SILVER.

Cherchez la femme—Prehistoric affection—Properties of silver—Derivation—Geological situation—Silver a by-product—Uncertainty of mining—How silver is deposited—World's production—Producing areas—Chief silver-mine in the world—Harvests and prices—Industrial consumption—Money by weight—The shekel and tael—A bird's-eye view.

THE first use to which silver was put by man is lost to view in the mists of antiquity. In what way notice was drawn to this metal must be of necessity a matter for speculation. Arguing from analogy, a shrewd guess would hazard that, as in most matters, a woman had something to do with it. The life of our prehistoric forefathers had much in common with that of the native inhabitants of Central Africa at the present day. Wants few, possessions limited, garments still less so! To provide these was the chief concern of the male. Womenkind in those days were certainly keepers at home, custodians of the Lares and Penates, a spare spear or two, a gourd of water, and the live embers in the sheltered rock corner.

Time must have hung heavily on the hands of our fair ancestress. What more likely to while away the leisure hours whilst her lord was tracking game, than the pleasing occupation of adding to her personal charms by collecting a few bright and shining stones to form a necklace withal? Surely no dream this, but sober fact! Silver entered with one leap into its useful career as a handsome curio, festooned around the shoulders of a lady. As might be expected from the constancy of woman's nature, her affection has been set on silver from that day to this. At her behest, and to seek her favour, the utmost ingenuity of man was early brought to bear, either to enrich this metal for the adornment of her person, or to fashion it as a mirror to reflect her charms.

In the process of this handiwork, silver was found to

possess exceptional qualities, which rendered it eminently adaptable for purposes other than mere personal trinkets. They may be described as follows: Silver possesses a fine metallic lustre of a subdued character, which harmonises agreeably with almost any surroundings, and thus is always pleasing to the eye. With the exception of gold, it is the most ductile and malleable of metals. It is stated that a weight of metal equal to one gramme can be drawn out into wire 180 metres in length, or, roughly, one-thirtieth of an ounce troy can be made into a wire 590 feet long; while, if hammered into leaf-form, a tenuity of ·0025 of a millimetre can be obtained, or one ten-thousandth part of an inch.

Its comparative scarcity and portability, and the value set upon it for the purpose of ornament, paved the way to a permanent function which it has performed from very early times indeed; that is, of forming a basis for exchange—in other words, of acting as money. For this purpose its hardness, as compared with gold, is an advantage, though its liability to the influences of climate and acid renders it less durable.

Since the discovery of electricity, it has been found to be the most perfect conductor of this fluid, standing to copper in the ratio of 100 to 75 and to gold of 100 to 73. It has not been brought into practical use in this way, owing to its prohibitive cost compared with that of copper.

Its average specific gravity is 10·57. The melting-point of silver is 1000 degrees Centigrade; at higher temperatures than this, it volatilises in a pale blue vapour. When it oxidises from exposure it absorbs twenty times its own volume of oxygen from the atmosphere. Oxidised silver is a misnomer, for the appearance is obtained by depositing a thin coating of copper-silver alloy upon the surface of the metal.

The Latin word for silver, *argentum*, is cognate with the Greek ἄργυρος, which is derived from ἀργός 'shining,' an evident reference to the fine polish that can be placed upon the metal. The Hebrew term *Keseph* is from a root which signifies 'to become pale.' In poetry it

is not unusual to find the moon described as either silver or pallid. The ancients associated silver with Diana or Luna, and its symbol was a crescent moon.

The principal forms in which silver is found are native silver, argentite, red silver ore, and horn silver. Native silver occurs in eruptive and in sedimentary rocks, forming strings or veins. It is associated at times with gold, platinum, bismuth, antimony, mercury, and arsenic, and has been obtained in localities as widely apart as Cornwall, Saxony, Siberia, Mexico, Nevada, Ontario, and Burma. The peculiar formation styled a vein displays the actual presence of silver, even to the eye of the uninitiated. Specimens secured from the important minefield at Cobalt, in Ontario, are specially interesting. One piece of ore will assay as much as 3000 ounces to the ton, that is to say, almost one-tenth part is pure silver; a second piece will show branching spurs of silver like the boughs of a tree; whilst a third piece of brown porous material has attenuated veins of silver curling outward from its surface like minute wires.

Argentite is a compound of silver and sulphur, blackish in colour. It is the most common ore of silver, and is to be found in districts similar to those where native silver is located. This coalition with sulphur is of course quite to be expected, for deposits of silver are usually associated with volcanic action.

Red silver ore conceals its value to the unskilled in such matters—a piece of such material containing perhaps 60 per cent. of silver appears rusty and crystalline, with no apparent likeness to silver at all. The latter ores are abundant in Mexico and California, and are to be found in Cornwall, Hungary, Spain, etc.

Horn silver is a compound with chlorine. It is more sightly than most other varieties of silver ore. The colouring includes pale shades of grey, sometimes greenish or bluish, occasionally nearly opaque and colourless. It is frequently associated with native silver, and occurs plentifully in South America.

The frequent combination of silver with lead or copper renders the precious metal from mines of this character

to be termed a by-product. Such ores are mined and worked for the sake of the baser metals, and silver forms merely an additional source of profit. As a consequence, the world's output of silver does not necessarily vary in accordance with the price ruling at the time, inasmuch as most of the production comes, willy-nilly, from the smelting of compound ores. The Cobalt minefield in Ontario is an exception. Here the silver deposits are so rich that the mines are worked practically for the sake of the white metal alone.

To a certain extent the price of silver does affect the production. When the value rules high an intelligent manager selects such lodes or dumps of ore as assay highest in silver, and relegates lower grade material to the time when the price rules low. But such selection is not always possible, and as a general rule the value of the baser metals and the accessibility of the ore are the deciding factors as to which portion of the material shall be worked first.

Silver-mines are usually situated in dry barren districts, *e.g.* Nevada, Arizona, New Mexico, Utah, Colorado, the deserts of Old Mexico, the arid tablelands of Chile, and the rocky fastnesses of Peru.

The uncertainty of silver mining is proverbial. The reason is that the metal is mostly found in a vein, which by some convulsion of the earth's envelope is not infrequently fractured, and the lost end may fail to be recovered—in a word, the mine may peter out.

Much speculation has arisen as to the action of Nature by which silver has been deposited in vein formation. Some scientists attribute it to the circulation of water. One theory supposes that the water welling up from the interior of the earth has been the medium of deposit. Posepny argued that since the mean density of the earth is 5·6, and that of the rocks which form the crust is only 2·5, the core of the earth must be considerably denser than the outside, and is therefore the home of the heavier metals. He considered that solutions impregnated by these metals were brought up to the surface and left to be solidified into the form of veins.

A—Descending into the shaft by ladders. B—By sitting on a stick. C—By sitting on the dirt. D—Descending by steps cut in the rock.

DESCENDING SHAFTS.

Reproduced from 'AGRICOLA,' Published 1556 *A.D.* (*p.* 4.)

Another suggestion is that the matter in solution was drawn laterally from adjoining surface rocks, but of such action there does not appear corroborative evidence. Aqueous deposition from above is another theory, and one which has many points in its favour.

A very plausible theory is that an ejection of matter in a fiery state was forced up from the interior of the earth by volcanic action, or through cracks caused by contraction of the earth's surface. There are two difficulties in the way of this theory, namely, the veins are mostly wider at the top than at the bottom, and also in many cases metallic copper and metallic silver are found side by side, and not fused together as might have been expected if the metal was ejected in a molten condition.

The production of the world has increased enormously, especially within the last fifty years. Any compilation of statistics previous to the sixteenth century of our era has not been attempted. The following figures are taken from figures compiled by Dr. Adolph Soetbeer and the Director of the U.S. Mint :

	Ounces.
1493-1520	42,309,400
1521-1544	69,598,320
1545-1560	160,287,040
1561-1580	192,578,500
1581-1600	269,352,700
1601-1620	271,924,700
1621-1640	253,084,800
1641-1660	235,530,900
1661-1680	216,691,000
1681-1700	219,841,700
1701-1720	228,650,800
1721-1740	277,261,600
1741-1760	342,812,235
1761-1780	419,711,820
1781-1800	565,235,580
1801-1810	287,469,225
1811-1820	173,857,555
1821-1830	148,070,040
1831-1840	191,758,675
1841-1850	250,903,422
1851-1855	142,442,986

	Ounces.
1856-1860	145,477,142
1861	35,401,972
1862	35,401,972
1863	35,401,972
1864	35,401,972
1865	35,401,972
1866	43,051,583
1867	43,051,583
1868	43,051,583
1869	43,051,583
1870	43,051,583
1871	63,317,014
1872	63,317,014
1873	63,267,187
1874	55,300,781
1875	62,261,719
1876	67,753,125
1877	62,679,916
1878	73,385,451
1879	74,383,495
1880	74,795,273
1881	79,020,872
1882	86,472,091
1883	89,175,023
1884	81,567,801
1885	91,609,959
1886	93,297,290
1887	96,123,586
1888	108,827,606
1889	120,213,611
1890	126,095,062
1891	137,170,000
1892	153,151,762
1893	165,472,621
1894	164,610,394
1895	167,500,960
1896	157,061,370
1897	160,421,082
1898	169,055,253
1899	168,337,452
1900	173,591,364
1901	173,011,283

	Ounces.
1902	162,763,483
1903	167,689,322
1904	164,195,266
1905	172,317,688
1906	165,054,497
1907	184,206,984
1908	203,131,404
1909	212,149,023
1910	221,715,763
1911	226,192,923
1912	224,310,654
1913	223,907,845
1914	168,452,942
1915	184,204,745
1916	168,843,000
1917	174,187,800
1918	197,394,900

The events which had the most important influence upon these figures are the Spanish discoveries of silver in Mexico and Peru about the middle of the sixteenth century, the exploitation of the Comstock Lode in the United States of America in about the third quarter of the nineteenth century, and the phenomenal production in Cobalt about the beginning of the twentieth century.

The following table gives the distribution of the world's production according to the respective countries concerned during the year 1918.

Country.	Ounces (Fine)
NORTH AMERICA—	
United States	67,810,100
Canada	21,284,600
Mexico	62,517,000
Total	151,611,700
Central American States and West Indies	2,900,000
SOUTH AMERICA—	
Argentina	25,000
Bolivia	2,435,000
Brazil	25,000

Country.	Ounces (Fine).
South America—*continued.*	
Carried forward	2,485,000
Chile	1,900,000
Colombia	325,000
Ecuador	40,000
Peru	10,800,000
Uruguay	..
Guiana—	
British, Dutch, French	8,000
Venezuela	3,000
Total	15,561,000
EUROPE—	
Austria-Hungary	1,750,000
France	..
Great Britain	50,000
Greece	350,000
Italy	500,000
Norway	270,200
Russia	400,000
Serbia	20,000
Spain	3,100,000
Sweden	31,500
Turkey	400,000
Total	6,871,700
AUSTRALASIA—	
New South Wales	
Northern Territory	
Queensland	
South Australia	
Victoria	
Western Australia	
New Zealand	
Tasmania	
Papua (North Borneo)	
Total	10,000,000

Country.	Ounces (Fine).
ASIA—	
India, Burma	1,970,500
,, Other	270,000
China	70,000
Chosen	26,000
East Indies—Dutch	400,000
Formosa (Taiwan)	26,900
Indo-China	1,000
Japan	6,600,400
Total	9,364,800
AFRICA—	
Belgian Congo	10,500
Egypt	800
Madagascar	20,000
Portuguese East Africa	1,200
Rhodesia	175,700
Transvaal, Cape Colony and Natal	877,500
West Africa (Gold Coast)	..
Total	1,085,700
Total for world	197,394,900

The above table is compiled by the Director of the U.S. Mint.

The chief silver-producing mine in the world in 1915 was the Anaconda, situated in the United States of America, which yielded 6,983,823 ounces. The second in importance was the Nipissing, in the Cobalt district of Ontario, the output of which was 4,610,051 ounces. The Real del Monte in Mexico has had a great record in the past.

Prosperity throughout the world, and favourable harvests in great silver-using countries like India or China, have a favourable effect upon the prospects of silver. An improvement in the demand for industrial purposes sets in almost immediately, but that for coining is not felt sensibly until after a succession of prosperous

years, because it is the sequel of cumulative activity in trade.

Based upon the natural increase in population, the demand for silver should increase about $1\frac{1}{4}$ per cent. per annum, but as a matter of fact the inquiry increases at a greater proportion. Not only is the scale of luxury higher than it used to be, but outlying portions of the earth, hitherto undeveloped, are becoming open to trade and the seductive wares of nations which use machinery for manufacture. This opening up of new markets also involves a greater use of silver for money.

The world's industrial consumption of silver has been estimated by the Director of the United States Mint as about two-thirds of the production.

Exclusive of the great Eastern nations, Great Britain, France, Germany, Russia, and the United States of America are the chief users of silver for manufacture. Exact figures are difficult to procure, because a considerable quantity of old metal-work is put into the melting-pot and refashioned, but the authorities of the United States have classified the totals annually furnished for its manufactures and arts from 1880 to 1914. The total in the thirty-five years was 485,500,000 ounces, of which 408,601,160 consisted of new material. The beginning of the twentieth century was signalised by a decided increase in consumption.

The method by which silver originally acted as money was by weight. It is recorded in the Bible that when Abraham, about thirty-seven centuries ago, purchased land as a grave for his wife Sarah, he 'weighed to Ephron the silver, which he had named in the audience of the sons of Heth, four hundred shekels of silver, current money with the merchant.' The shekel of those days was not a coin but a weight. In Saxon days and long after, the standard measure of value in England was a pound weight of silver, and it is a curious fact that London assayers reported the quality of silver in a given piece of metal up to the year 1906 as so many pennyweights in the pound worse or better than the standard quality. Even to the present day, the custom obtains in China of making

payments by weight. The tael, a money of account, is actually a weight, and the silver currency of China, called *sycee*, is calculated in taels. The subject of silver money will be dealt with subsequently.

In the chapters immediately following, the past history as well as the present distribution of silver mining will be described. The object is to obtain, by taking in turn the various continents, a bird's-eye view of the world's production. Some of the countries touched upon may not be important as to their silver contribution at the present time, but their presence in the narrative is necessary in order to gather a well-balanced idea of the subject. For, though their production at a past period may have been small, yet in proportion to the world's output it may have weighed more heavily in the scale than that of countries whose eventual output proved much larger.

CHAPTER II

PRODUCTION OF EUROPE

Roman mining in Britain—Queen Elizabeth and Houghstetter—Mines under the sea—The Gauls—Saracens active in Pyrenees—Wars fatal to mining—Germany the classic land of metallurgy—Worked by shares—Production of Annaberg—Cobalt mines in Saxony—Schneeberg output—Saxony blue—Nugget as banquet table—Austrian production in 843 A.D.—Joachimsthal—Hungarian mining in seventh century—Italy's contribution small—Spain's share in ancient times—Strabo and New Carthage—Modern Spanish mines—State-owned mines in Portugal—Also those in Norway—Russia undeveloped—Altai mines of great antiquity—Mount Laurion mines in Greece re-opened 1864 A.D., after 1900 years—Tools still in position—The mainstay of Athens—Closing of mines coincident with decay of Athens—Value of dumpings.

THE history of silver-producing mines in the United Kingdom has been chequered. In recent times the yield has dwindled to almost nothing. There is little doubt that silver was found plentifully in very early days, and that veins were worked some time before the period of the Roman occupation of this island. But no evidence exists of any flourishing industry during many succeeding centuries after the Romans evacuated the country. In the sixteenth century, mining seems to have been practised far less intelligently than on the Continent. We are told by Sir John Pettus, that about the third year of her reign Queen Elizabeth sent for some Germans who, she was advised by her Cabinet, were well experienced in mining. The experiment was successful, and three years later she granted mines in eight counties to one Houghstetter, a German.

Cornwall, always a most important mining centre, contains some of the most ancient workings. On occasion the lode dips under the sea, and in the time of rough weather the dashing of waves against the cliffs, or the

A—Shaft. B, C—Drift. D—Another shaft. E—Tunnel. F—Mouth of tunnel.

SECTION OF MINE.

Note men protecting the approaches of their respective mines.

Reproduced from 'AGRICOLA,' Published 1556 A.D. (*p. 12.*)

grating of shingle upon the shore, can be heard distinctly in the tunnels. In this country silver has been found in conjunction with lead : many of these mines have now ceased working entirely, though at one time they were quite rich. In 1855 the average silver contents of these ores was about 23 ounces to the ton, and in some instances reached as high as 46 ounces. An improvement in the quality of the ore as the miner passed from the higher to the lower levels was an unusual feature. The production fell almost continuously from 255,640 ounces in 1851 to 2,200 in 1886.

In Devonshire lead mining dates back to the Roman occupation. In the reign of Edward the First the mines were worked on account of the Crown in order to obtain silver for coinage, but operations were always irregular. Wales, also the Isle of Man and Scotland, produce a certain amount of silver from lead-mines. The output, however, is now of little consequence, though the quantity must have been considerable in past days so far as Wales was concerned, for the letters W.C.C. were inscribed upon coins of the seventeenth century, to signify that the silver was supplied by the Welsh Copper Company.

In 1918 the production of the United Kingdom was about 50,000 ounces, whilst in 1913 the total was about 120,500 ounces, of which about 4,000 came from copper and zinc ores, the remainder from lead.

Some of the outlying States of the Empire are producers, such as Rhodesia and the Union of South Africa. British possessions which have outputs of importance will receive separate mention in succeeding chapters.

The production of France is, and has been, more or less substantial, and dates from a distant past. The Gauls, to use the ancient name of the people, were familiar with many metals such as gold, silver, lead, copper, and iron, prior to the Roman Conquest of their country. During the period of Roman rule the authorities encouraged, and probably did more than encourage, mining operations, by introducing a system of forced labour. The hordes which overran the country from the north brought this activity

to an end, and the mines were abandoned for the time being. A revival was brought about by the Saracens, who exploited promising areas in the Pyrenees and other districts, but it was not until the eleventh century that the mines of France were really developed.

The frequent wars of the Middle Ages were fatal to enterprises the success of which depended upon continued and persistent effort, and mining industry was almost at a standstill from the thirteenth to the sixteenth century. The resumption was shortlived, for the advent of the Thirty Years' War again arrested work.

It was not actually until the eighteenth century that mining was established upon a satisfactory basis, and began to flourish in Brittany, the Pyrenees, the Vosges, and Central France. The Vosges mines had been discovered in 1315, but having been worked unsuccessfully, the workings fell in. After several attempts to resume operations, they failed to pay, and were finally abandoned in 1816. At the Pongibaud Mines in Central France, the lead flowing from the furnace yields considerably above 100 ounces of silver to the ton. The production of France during the year 1918 was not reported: it used to be about 500,000 ounces.

Germany is the classic land of mining, not only because its extensive area is rich in minerals, but also because the kindred arts of mining and metallurgy were here first taught and practised systematically. The mining academies of Germany have been frequented by students from all parts of the civilised world. It was stated of Queen Elizabeth '. . . . . from Her observation of the inartificalness of former ages in this concern which may be collected from Her sending for and employing so many Germans (where mines are plentiful and the arts belong to them) who might put us into the tract of managing ores; in finding and digging them, and in melting and refining metals. . . .'

Agricola states that the silver-mines of Freiberg were discovered during the rule of Prince Otho, about 1170 A.D. The deposits of Annaberg were discovered in 1492 (a year which possesses special interest for inhabitants of

America, as that when Christopher Columbus first sighted its shores). As soon as a vein was discovered, the exclusive right to work it could be obtained for a small fee from the mining office. It was the universal custom to divide the 'mine' into one hundred and twenty-five equal shares, to which were added four 'free' shares, one of which was given to the owner of the ground on which the discovery was made, another each to the town, the hospital, and church. The silver produced from the rich ores was quickly converted into money at the mint, and the many fortunate enterprises attracted outside capitalists. The number of men employed as miners was about two thousand.

Mr. G. R. Mickle, in a paper read before the Canadian Mining Institute, gave the following interesting details: 'The term "Mine" was indefinite then as it is now, and, as it will appear, they were mostly small affairs; thus the records show that there were during the whole life of the district 635 mines that gave dividends; of these, however, over half, or 338, only lasted a year at most. The greatest number of profit-earning mines in any one year was 38, and the total number which produced silver was 969.

'The richest mine in the Annaberg district paid dividends in its best period at the rate of $220,000 per year. Sixteen of the leading mines are credited with a total dividend of about $1,850,000, and the whole sum paid in dividends amounted to $5,550,000 as far as recorded.

'From the information given the total silver production can only be very vaguely estimated. Including good and bad, an average of twenty cents per ounce profit produced would only give about 28,000,000 ounces as the total production, and 50,000,000 would certainly be an extreme estimate. Cases are mentioned where dividends produced amounted to over one dollar per ounce, and about fifty cents per ounce profit is mentioned as the average of a number.' Mr. Mickle pointed out that as the profit used to be shared out as soon as made, immediately profit ceased, work had to be abandoned.

Mining operations in Saxony were first instituted in

1160 by emigrants from the Hartz district. The discovery was made by some wagoners carrying salt to Bohemia, who found some pieces of silver-lead ore on the road, and handed the pieces to friends in the Hartz mountains. In 1894 the smelting works of the Hartz district produced about 250,000 ounces of silver.

Schneeberg had a greater reputation than Annaberg, and was always considered the greatest silver-mining district in Germany, but there is an absence of reliable information as to its output. If it be taken as 100,000,000 ounces (it is more likely nearer 50,000,000 ounces), it would be smaller than the total output of the similar class of mines in Cobalt, Ontario, which are not expected to produce less than 200,000,000 ounces. There is no doubt that the output from Canadian territory greatly exceeds in actual weight of silver that from the far older mines of Europe, although, at the low silver prices which ruled before the war, the value may be more approximate.

The date when cobalt mining in Saxony actually commenced is not known. The beautiful colour called Saxony blue is said to have been discovered by a Frenchman named Peter Weidenhammer, who settled in Schneeberg in 1520, and who found a ready market for his invention in Venice at about 75s. per cwt. In the early part of the seventeenth century cobalt mining came under the direct supervision of the State, and ultimately developed into a purely State undertaking.

The first discovery of silver ore was made in Schneeberg in 1470, and the growth of the industry was phenomenal. In 1474 there were 176 producing mines. The most famous was the St. George, at a spot where veins of different formations joined. One enormous block was found weighing 20 tons, described as 6 feet wide and 12 feet high, consisting of native silver, argentite (ruby silver and chloride of silver). It is related that the Duke of Saxony gave a banquet underground, and made use of this nugget as a table. Silver mining seems to have died down after about twenty-five years, owing to war troubles, but was revived later. The proportion of silver now derived from these mines is extremely small.

The total production of Germany in 1914 was 4,984,677 ounces—probably much less during the war.

Turning to the Austro-Hungarian Empire, silver is to be found in Hungary, Transylvania, and Bohemia. Gold mining was in operation in the Roman period, but it was not until 843 A.D. that silver was worked. The first mine opened was at Przibram, where the workings are still in existence, and must be numbered amongst the deepest in the world. Silver and lead were obtained near Pilsen previous to the twelfth century, and the discovery of these metals fixed the site of the town. Other towns, Iglau, Nellisau, and Eylau, owe their existence to the proximity of ore deposits. Mining industry was almost abandoned as a consequence of the religious wars of the fifteenth and sixteenth centuries, though the townsfolk remained.

Early in the sixteenth century a flourishing mining centre was created at a place called Joachimsthal. The output of silver was so substantial that a mint was erected on the spot, and silver coins were struck which went by the name of Joachimsthaler. The word was contracted in common parlance to Thaler, and ultimately obtained a world-wide notoriety in the corrupted form of 'Dollar.' Joachimsthal—a quaint old-fashioned gabled town—nestles upon the southern slope of the Bohemian Erzgebirge. In 1517 A.D. a staff of 8,000 miners was engaged in the mines and formed with their dependants a population of 20,000. About 9,800,000 ounces, quite a goodly amount for those days, are said to have been raised between 1516 and 1589.

Subsequent operations were interrupted by the Thirty Years' War. Reopened in the year 1700 A.D., the mines have been worked more or less up to modern times.

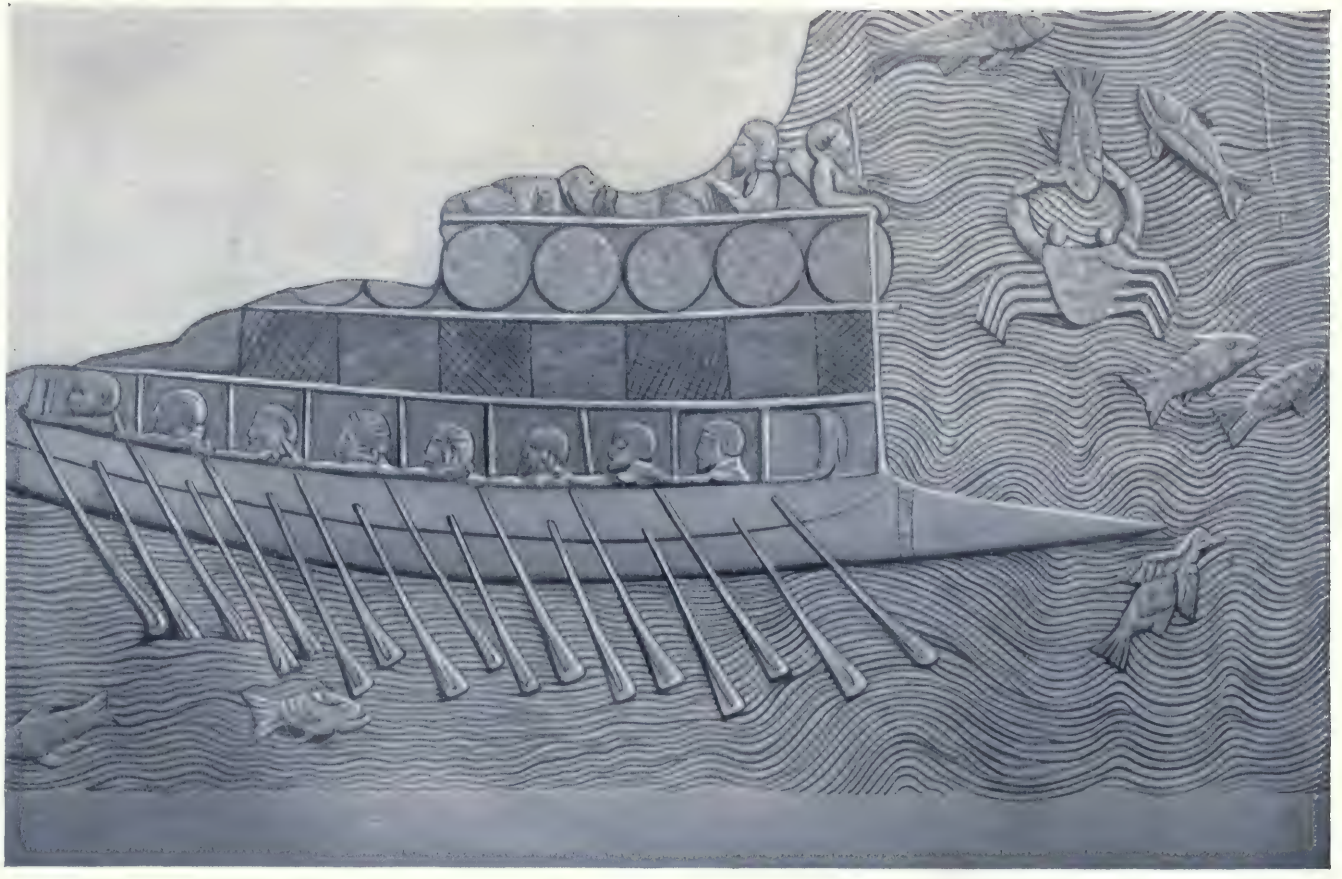
In the Tyrol, silver mining was undertaken as early as the tenth century. During the fifteenth and sixteenth centuries mines flourished near Innsbruck, at Schwaz, and elsewhere, but the Thirty Years' War caused a cessation in their activities which lasted until the eighteenth century.

Lower Hungary has the credit of being the first

district in the Empire to possess silver-mines. It is said that some date back to the seventh century A.D. At one time important mines existed at Goosdanske, but war, that fatal enemy of mining industry, in this instance with the Turks, caused them to be abandoned. Eight centuries later, German settlers accelerated the mining operations carried on at Schemnitz, in Upper Hungary, where, for many centuries afterwards, silver was freely produced. In 1894 the production of Austria-Hungary was about 3,500,000 ounces : it has since fallen off. That for 1918 is given as about 1,750,000 ounces.

Italy has never figured largely as a producer of silver, although abundance of other metals have been found within her borders. The only silver ores of importance were discovered in the year 1870, on the western coast of Sardinia, whence 771,600 ounces were obtained in 1881, 480,000 ounces in 1885, and 500,000 ounces in 1918.

There is no doubt that Spain figured as one of the most important sources of silver in the ancient world. The metal appears to have been found on the surface in outcrops of native or free silver—a valuable circumstance at a time when the science of metallurgy was in its infancy. Strabo refers to ancient Spain in the following passage : 'Polybius, 200-125 B.C., speaking of the silver-mines of New Carthage, tells us that they are extremely large, distant from the city about 20 stadia, and occupy a circuit of 400 stadia, that there are 40,000 men regularly engaged in them, and that they yield daily to the Roman people (a revenue of) 25,000 drachmae. The rest of the process I pass over, as it is too long; but as for the silver ore collected, he tells us that it is broken up, and sifted through sieves over water; that what remains is to be again broken, and the water having been strained off, it is to be sifted and broken a third time. The dregs which remain after the fifth time are to be melted, and the lead being poured off, the silver is obtained pure. These silver-mines still exist; however, they are no longer the property of the State, neither those nor those elsewhere, but are possessed by private individuals. The gold-mines, on the contrary, nearly all belong to the



A PHOENICIAN GALLEY. (*p. 18.*)

State. Both at Castlon and other places there are lead-mines worked which contain a small proportion of silver, but not sufficient to pay the expense of refining.'

Mining on really scientific principles was not undertaken until the sixteenth or seventeenth centuries, when operations were commenced at Guadcanal in the neighbourhood of Seville. The most important modern discoveries were made at Hiendelaecina, not far from Madrid. The mines were opened in 1843, and appear to have been exhausted in 1866. During the period from 1847 to 1866 smelting operations are said to have yielded about 7,600,000 ounces. At Herrerias, in Andalusia, native silver is found in the form of flukes, needles, and crystals. The production of Spain during the year 1918 amounted to 3,100,000 ounces.

The mineral treasures of Portugal were worked successively by Phoenicians, Carthaginians, and Romans. In more modern times ownership has been vested in the State, and there has been a lack of enterprise unfavourable to development. The mining laws were remodelled in 1852. In 1914 a total of 206,000 ounces was obtained as a by-product from other metals. Probably little change has taken place since.

Norway possesses some small but noted mines at Kongsberg, which were first worked in 1623. They are the property of the State, and are in three groups—the Kongers and Armen Mines, the Gottes Hulfe, and the Hans Sachen. In 1893 the output was respectively 84,000, 33,000, and 6,000 ounces. The total output of Norway in 1918 was 270,200 ounces.

Sweden cannot be said to possess silver-mines, but produces a small quantity as a by-product of other metals.

Silver-mining industry in Russia is as yet in its infancy. It suffers from the lack of railway communication in the empire, and also from a deficiency of capital and enterprise. The Altai Mines are the most ancient mines of all, and are still being worked. They produced about 300,000 ounces in 1891. The Ural output in 1913 amounted to 600,000 ounces, and Eastern Siberia provided

a further 29,000 ounces. Mining operations of a primitive character take place on the Kirghis Steppes. Russia still awaits exploration of its mineral wealth, for which its geological formation offers great encouragement; but the shortness of the summer months, and the absence of easy communication by water or otherwise, render it one of the most backward countries in the world as to the development of its natural resources. In Siberia especially a great field exists. A promising quartz lode is being worked at Ekaterinburg.

In 1892 the production of Russia was 350,000 ounces. The total could be made much larger, though the estimate for 1918 is only given as 400,000 ounces.

The output of Turkey in 1917 was 400,000 ounces.

The record of mining in Greece is remarkable because of the great interval, of about one thousand nine hundred years which terminated in 1861 A.D., during which the industry remained absolutely dormant. Activity was revived by the formation of a company in 1864 to work the lead slags of Laurion. The only form in which silver has been found in the country was in conjunction with lead, of which the assay averaged about 81½ ounces to the ton.

The ancient workings, which cover about a mile and a half square, can be traced distinctly, and descended as far as the fourth level. Development has been carried out scientifically with shafts and tunnels—the latter supported by pillars. So thoroughly had the work been done, that only untractable ore had been left in the ancient portions of the mine. When the workings were reopened the actual tools, picks, and sledges were found just as the workmen had thrown them down nearly two thousand years before. The original steps lay in position, and niches on the walls could be observed where lamps had been placed. The deepest shaft was 395 feet deep, whence the ore was drawn probably in sacks of hide, and then smelted upon the surface in small blast-furnaces with hand-bellows.

These silver-mines formed the economic mainstay of Athens for the three centuries during which the State

had the ascendancy in Greece, and there can be no doubt that the dominance of Athens and its position as a sea-power were directly due to the revenues derived from them. The first working of the mines is shrouded in mystery. The scarcity of silver in the time of Solon (638-598 B.C.) seems to indicate no very considerable output at that time. According to Xenophon (*Essay on Revenue of Athens*, iv. 2), written about 355 B.C., 'they were wrought in very ancient times.' The first definite discussion of the mines in Greek records begins about 500 B.C., for about that time the royalties began to figure in the Athenian Budget (Aristotle, *Constitution of Athens*, 47). There can be no doubt that the mines reached great prosperity prior to the Persian invasion. In the year 484 B.C., the mines returned 100 talents (about 83,700 ounces troy) to the Treasury, and this, on the advice of Themistocles, was devoted to the construction of the fleet, which conquered the Persians at Salamis (480 B.C.). The mines were much interfered with by the Spartan invasions from 431 to 425 B.C., and again by their occupation in 413 B.C.; and by 355 B.C., when Xenophon wrote, the exploitation had fallen to a low ebb. By the end of the fourth century B.C., the mines had again reached considerable prosperity, as is evidenced by the orations of Demosthenes against Pantaenetus and against Phaenippus, and by Lycurgus's prosecution of Diphilos for robbing the supporting pillars. The domination of the Macedonians under Philip and Alexander at the end of the fourth century and the beginning of the third century B.C., however, so flooded Greece with money from the mines of Thrace, that this probably interfered with those of Laurion; then, at any rate, the decadence of these mines set in. From this time also, Athens fell from her high estate, and the State was not able to maintain, except fitfully, its own independence. Finally Strabo, writing about 30 B.C., gives the epitaph of every mining district—reworking the dumps. He says (ix. 1, 23): 'The silver-mines in Attica were at first of importance, but are now exhausted. The workmen, when the mines yielded a bad return to their labour, committed to the

furnace the old refuse and scoria, and hence obtained very pure silver, for the former workmen had carried on the process in the furnace unskilfully.' The traces of ancient development show that an enormous amount of labour was expended. Two thousand shafts had been sunk to an average of 250 feet. It is believed that the period of greatest activity was in 600 B.C. and the following one hundred and seventy years. In these days the labour was performed by slaves, of which 15,000 were employed at one time, but in the time of the Peloponnesian War the helots revolted. During the Roman occupation the mines were worked for the Imperial benefit under Greek factors, until Laurion was abandoned in the first century A.D. The refuse material left on the site is estimated to contain 270,000 ounces of silver.

Silver is also to be found at Karysto, and in the isles of Antiparos, Sphanto, Zea, Anaphi, Milo, and Santorin. The total production of Greece in 1918 was given as 350,000 ounces.

The only state amongst the small countries producing silver is Serbia, which yielded 20,000 ounces in 1918.

A MEXICAN VILLAGE. (*p. 23.*)

CHAPTER III

PRODUCTION OF MEXICO

One-third of the world's output—Magnificent metallic resources—The Toltecs ruined by intemperance—The Aztecs—Eagle omen—Montezuma—Civilised but brutal—Sacrificial temple—Cortes' expedition—Treacherous friendship—Unavailing presents—Cortes forcibly expelled—Again returns—Awful slaughter of inhabitants—Rule of Spain for three hundred years—Hill of Frogs—Geological details—Divining rods—Zacatecas—Sonora—Largest nugget in Mexico—Waiting development—A bridal path—A wealthy widow—A lost mine—Dangerous Indians—Mexican churches—Quicksilver supplies—Output of Mexico.

THE immense production of Mexico—lately averaging nearly one-third of the world's total (in 1912 25 per cent. more than that of the second in the list, the United States of America)—together with the antiquity of its mines, render Mexico without doubt the silver-producing country worthy of first consideration.

Of all the extensive territories discovered by Spain in the New World, and of which her great colonial empire was composed, none equals Mexico, either in the magnificence of its resources, mineral and otherwise, or in its high state of civilisation prior to subjugation by the invading race. It has been described as a land where none ought to be poor, and where misery ought to be unknown, endowed with every gift that man can desire or envy, all the metals from gold to lead, every sort of climate from perpetual snow to tropical heat, and inconceivable fertility. It is a remarkable circumstance that so great a eulogium should be bestowed upon a country which has lapsed into a condition of anarchy, of futile jealousies, and political murders, of pillage and rapine, and within which rival presidents have been so plentiful during recent years.

The ancient history of Mexico centred round the vale of Anahuac, midway across the continent. At an elevation of 7,500 feet, studded in ancient times by five lakes fringed with trees and grassy slopes, it lay like a basin ringed with rocky eminences. About the seventh century the Toltecs settled in the neighbourhood and reared great edifices, the ruins of which remain to excite the admiration of travellers.

This ancient people seem to have practised many industrial arts, particularly the use of metals. Historic traces of this people are shadowy, to be sought in legend and story passed from mouth to mouth. They came and went—a people of mystery. Rumour has it that the discovery of pulque, a fiery drink distilled from the cactus, had much to do with their fall. The tale runs that in the reign of Tepancaltzin, one of his kinsmen discovered the tempting liquid oozing from a hole gnawed by a field-mouse, and sent it to the monarch by the hand of his lovely daughter Xochith, whom the king added to his harem. The downfall of the Toltecs is said to date from this event: they neglected their arts, agriculture, and their warlike habits, and were driven out of the fertile valley by the Chichimecs about the year 1100 A.D. This legend is perpetuated in the name given to many of the drinking booths devoted to pulque, namely, La Hermosa Xochith, or the Beautiful Flower.

The Chichimecs were followed by other races, of ascending grades in the scale of civilisation, until the domination fell, early in the fourteenth century, into the hands of the Aztecs, who, like preceding conquerors, came from the north. In the year 1325 they reached the Anahuac Valley, and there recognised as an auspicious omen a royal eagle, perched upon a prickly pear bush, with a serpent in its talons, sunning its widespread wings in pride and splendour. This picture adorns Mexican silver dollars to this day, and is a familiar object in China to many millions who use the coin as currency, and is almost the sole link between the two countries.

Two hundred years later the Aztecs enjoyed great

prosperity. They had learnt how to profit by the metallic riches within their territory, and to secure the choice products of adjoining lands by means of trade.

During the reign of King Montezuma the cities abounded in products of the loom, feather work, drinking vessels of gold and silver, armour enriched with ornament, collars, bracelets, and earrings of the precious metals, as well as grain, fruits, cacao, and articles for literary use, such as paper manufactured from the ungainly but useful cactus. The writing then current was in the form of hieroglyphic painting. Montezuma maintained a large army, whose dress consisted of quilted cotton, a useful defence against the arrows of Indian tribes. The great chiefs wore cuirasses overlaid with thin plates of silver or gold. Their heads were protected with silver or wooden helmets surmounted with plumes of waving feathers, producing an effect martial and picturesque.

The palace of the kings comprised a vast pile of buildings. The decorations within were gorgeous, the walls were draped with rich hangings and the roof inlaid with cedar and scented woods. A quarter assigned to workers in the precious metals was to be found in the market-place, where articles could be purchased for use or ornament. Here were to be found on sale many curious silver toys, fashioned ingeniously in the form of birds, or fishes with movable scales.

The central feature of the capital was the Great Teocalli, or sacrificial temple, constructed by Ahuizoth, and consecrated in 1486 by the massacre of a multitude of victims reputed to have numbered 20,000. The temple was surrounded by a wall ornamented with serpents. A huge serpentine drum summoned the people to worship, if such devilry could be so described, and the image of the War-god himself had the coils of a serpent around his waist, a most suitable emblem for such a cruel and blood-thirsty religion. The temple itself was in the form of a lofty pyramid, ascended by a succession of external steps. On the summit was a large block of jasper, upon which perished uncounted sacrificial victims.

On April 21, 1519, the Spanish Captain Cortes landed on the spot where the city of Vera Cruz now stands. Attracted by report of the riches and splendours of the capital of Mexico, he destroyed his ships, and advanced into the heart of the country with a small band of 400 foot and 15 horse, together with 7 pieces of artillery. Native hereditary enemies of the Aztecs, to the number of several thousands, joined his expeditionary force.

The enthusiasm of historians have invested the affair with the glamour of romance, and have pictured Cortes and his followers as of heroic mould. The enterprise upon which they entered certainly was inspired by reckless bravery, but really it was nothing more or less than a filibustering expedition. The aim of the adventurers was to seize the Eldorado of their dreams, and, stripped of the imagery which Prescott, the historian, and others have woven around the campaign, the narrative is replete with deceit and savagery.

The invaders—professing the friendliest of intentions—were received by Montezuma with every mark of honour. Among the gifts proffered by his ambassadors to the visitors were shields, helmets, cuirasses embossed with plates, and ornaments formed entirely of pure gold. The presents included imitations of birds and other objects fashioned in wrought or cast gold and silver, a Spanish helmet which had been sent to the capital and returned filled to the brim with gold-dust, and two circular plates as large as cart wheels. One of these plates, apparently representing the sun, was richly carved with plants and animals. It measured thirty palms in circumference, and was worth at least twenty thousand pesos de oro. The other wheel was of the same size in silver, also elaborately ornamented. An early opportunity was taken by the guests of the Emperor to make him prisoner, and the then leaderless people were slaughtered ruthlessly by the Spaniards and their savage allies.

Cortes was driven from the capital by force of numbers, together with the three daughters of Montezuma,

who had been committed to his care by their dying father. Nine months later he returned with a larger army and captured the city after a desperate resistance from the Aztec garrison and townsfolk. Cortes allowed the surviving Mexicans to leave the surrendered city without molestation. The male inhabitants who departed from the abandoned metropolis were estimated to be upward of thirty thousand in number, besides women and children, but the tale of those slaughtered during the siege has been computed as nearly a quarter of a million. The most satisfactory item in the account is the disgust felt by the conquerors at the meagreness of the booty. There was shrewd suspicion that the greater part of the treasure had been jettisoned into one of the five lakes which surrounded the invested city.

These events have been dealt with at some length, because the narrative illustrates so forcibly the craving created by the precious metals within the heart of man. The quotations and details that follow are taken from the wealth of general information in Terry's *Mexico*.

Mexico remained subjected to Spain for three hundred years (from 1521 to 1821 A.D.), and was governed in almost autocratic fashion by five governors, of which Cortes was the first, followed by sixty-two viceroys. The first viceroy, Antonio de Mendozy, a very humane man, ruled from 1535 to 1550 A.D., and issued the first money minted in Mexico, the produce of the mines of Guanajuato and Zacatecas. The former word means Hill of the Frogs; it was not so named because it was the habitat of these amphibians, but because the hill once possessed an enormous stone, chiselled to represent a frog, which once was an object of worship by the ancient Chichimec tribe.

'The Crown taxes upon mining, blasting-powders, and the like were so heavy that it was unprofitable to extract ore carrying less than 100 ounces of silver to the ton. The King's Fifth was collected upon all bullion presented for coinage.

'Igneous rocks of almost every geological epoch form, to a large extent, the superstructure of the Great Cen-

tral Plateau, where many of the most celebrated mines are located. This great tableland consists mainly of metamorphic formations which have been partly upheaved, partly overlaid by igneous masses of all epochs, and are chiefly represented by shales and limestones. All these formations are alike remarkable for the abundance and variety of their metalliferous ores, such as silver, copper, gold, and what not.

'From this amazingly prolific region the Toltecs and Aztecs mined gold and silver from shafts and galleries sunk at great expense of time and toil. Gold was also obtained from the beds of mountain torrents and from the sand on the coast. Like the natives of Peru, they worked mines so ancient that no man can estimate the date of origin.

'The early Spanish explorers were expert with divining-rods, and were not long in discovering the mineral wealth concealed in the mountains of what is now the State of Zacatecas, to the north-west of Guanajuato. Thence began and was maintained a stream of silver Spainward that could scarcely have been exceeded had it travelled by a modern pipe-line. According to old chroniclers, the district yielded, between 1548 and 1832, silver bullion to the value of 667,343,299 pesos —a very tidy sum! The workings were very crude; had they been up to modern standards, the output would perhaps have been doubled.

'Ever since their valuable contents were discovered, the mountain regions have continued to yield enormous quantities of precious metal. The old mines, with which the ground beneath the city of Zacatecas is honeycombed, are still worked, and new claims are being constantly added. More than a hundred mines are in operation, and the annual output of silver aggregates £6,000,000.

'The history of Sonora is linked with that of its mines. The ability of a Spanish governor to locate a mine was almost a sixth sense, and the friars who formed his retinue had a genius for extracting secrets from the Indians as to hidden treasure and for setting them to

AN ARRASTRO, OR PRIMITIVE ORE CRUSHER. (*p. 28.*)

work in the interests of the clergy. The largest silver nugget ever found in Mexico was discovered near an Indian pueblo in Sonora, and weighed 2,750 lbs. The most important silver-producing states are Guanajuato, Zacatecas, Durango, Sonora, Chihuahua, Melico, San Luis Potosi, Hidalgo, Jalisco, Sinaloa, and Oaxaca. The Real del Monte Mine in Hidalgo is one of the greatest producers in the world. Many mines and placer-workings were taken over from the Indians by the Spaniards, who opened up many new regions. The first silver taken from a Mexican mine by Europeans, and sent to a European country, came from the still celebrated mines of Jaxco, in the State of Guerrero, in 1521.'

It is estimated that from 1521 to 1891 A.D., Mexico produced silver to the value of $4,000,000,000. If the bulk of these dollars be considered as worth 4s. each, the total output to date must exceed considerably £1,000,000,000 in value.

During the years 1781 to 1800, other authorities estimate that Mexico yielded quite two-thirds of the world's production during that period.

Railway communications in this country are still poor, and many districts, known to be exceedingly rich in metals, are even now almost inaccessible. Mule-back is a poor substitute for the metal steed, especially to the miner.

The possibilities of the future are immense. A settled form of government, and a judicious expenditure upon railways and other aids to development, would not only maintain Mexico at the head of the list of silver-producing countries, but in all probability render it substantially pre-eminent. Three-fourths of the mineral possibilities of the Republic are said to be unexploited; but that they are attracting the attention of capitalists and miners is proven by the fact that upwards of five thousand fresh claims are registered in each year.

'It is related of the famous Quintera Mine (Alamos district) that the owner (Señor Almada), on the occasion of the marriage of his daughter, lined the bridal chamber

in his palacio with rows of silver bars, and paved the path from the house to the church with the same pale chaste material. Thus the bridal party trod upon almost fabulous wealth as it proceeded to the altar.

'The Dona Maria Mine (in the Huacal district) was once exploited by a Spanish widow, Dona Maria de Rodriquez, who accumulated great wealth in the shape of ingots, which she stored in a strong and well-guarded room within her dwelling. Deciding to pass the remainder of her life in Spain, she loaded her treasure upon the backs of forty mules, and travelled to the city of Mexico escorted by her retainers. It was estimated that each mule carried 200 lbs. of gold and silver bars, so that the tangible wealth of the fortunate widow was represented by about four tons of precious metal. According to the old chronicler, the lady did not breathe freely until she had deposited her fortune in the hands of the Spanish viceroy in the capital. Soon thereafter she ceased to breathe altogether, for she suddenly and mysteriously disappeared. The common report was that she had been murdered and her great fortune appropriated. This was probably the case, as the indictment was never disproved.

'One of the mines of the Estrella del Norte Mining Co. (near Arispe) was "lost" for many years. The only record touching its position was a note on an old Jesuit map, to the effect that "the opening of the tunnel can be seen from the door of the Mission Church." For years the hills in front of the door were searched for miles with no results. In 1905 a side wall of the old church crumbled to ruins and disclosed a hidden door, the existence of which had never been suspected.' From this door the hillside was searched with the aid of a field-glass, the lost mine was traced, and a huge fortune amassed.

'The Yaqui Indians were formerly as savage as Apaches, and many rich mines were long "lost" because the miners had been killed and prospectors driven away from the region. In 1905-6 the Mexican Government took a determined stand against these wilful children of

the desert, and transported many of them to Yucatan. Since the removal of these obstacles to prosperity, many "minas antiquas" are being rediscovered.' So crude were the methods of the early Spaniards, that discarded dumps worked by modern machinery produce results almost as valuable as those obtained by the original miners from the original high-grade ore.

Notwithstanding the enormous export of silver during the time of the Spanish dominion and since, the country abounds with evidences of its wealth in precious metals, chiefly in the adornment of its churches. The architecture of these buildings is too florid to please European taste, yet the effect of the gilt or silvered interior is extremely rich.

'The Baroyeca church owes its existence to the discovery (in 1792) of a rich mine called the Mina Grande, in the Baroyeca Mountains. Prior to 1850 the walls of the Santuario and the Trascoro were covered with sheets of pure silver, the product of the famous mine. The sacred altar vessels were of pure gold, and the candelabra, the altar railings, and parts of the sanctuary, of silver.

'To certain of these wealthy churches, in the midst of rich silver-mining regions, Mexico owes many of the fine paintings and art antiques in the Republic. Rich miners sometimes endowed churches with fabulous sums, and not a little of the money found its way to other countries to be invested in such ornaments. Much of this Mexican wealth, however, disappeared from the churches soon after the Reform Laws, which decreed the sequestration and nationalisation of church properties.

'According to trustworthy authority, some of the older buildings in Chihuahua contain enough silver in their walls to render their demolition and reduction a profitable undertaking. The early Spanish method of extracting silver ores was so primitive, that a considerable quantity of valuable mineral was thrown away as dross after the reduction of the ores. In the absence of better material this slag, mixed with silver refuse, was used for the construction of houses.'

It is difficult to ascertain the early production of Mexico, because no exact records have been preserved, but some idea can be gained from the total of the coins struck by the Spanish colonial mints. The activity of the mining industry depended upon the ease or otherwise with which mercury was obtainable, for this metal formed a vital constituent of the mining process which then obtained. Large quantities were required—no less than 800 tons were consumed in the year 1808. The mercury lost in the process was 100 lbs. for each ton of ore, containing 640 to 1000 ounces of silver. Before the year 1770 quicksilver was drawn from two places only, namely, Almaden in Spain and Huancavelica in Peru, but in 1784 a contract was arranged between the Spanish Government and the Emperor of Austria, by which the latter undertook to supply 12,000 cwt. annually at 52 dollars per cwt. As the price of mercury fell, naturally the production of silver increased.

The wide fluctuations of the output are apparent in the following figures, selected from representative years.

	1690	4,994,000	ozs.
	1752	12,824,000	„
	1764	9,216,000	„
	1796	22,832,000	„
	1800	16,789,000	„
	1805	24,208,000	„
Average of	1806-10	11,247,000	„
„	1811-15	9,972,000	„
„	1816-19	9,260,000	„
„	1884-94	22,117,000	„

Owing to the stoppage of the traffic on the Mexican North Railway by the revolutionary bands, many mines in Chihuahua were shut down in 1913, but the Alvarado mine succeeded in moving some bullion by wagon train. Civil disturbances in Mexico during the last few years have considerably limited the output, especially in the northern districts.

The production during the twentieth century has

been estimated by a first-class Mexican authority as follows :

For the financial year commencing in			1900	.	58,416,000	ozs.
,,	,,	,,	1901	.	57,000,000	,,
,,	,,	,,	1902	.	65,071,000	,,
,,	,,	,,	1903	.	64,718,000	,,
,,	,,	,,	1904	.	62,114,000	,,
,,	,,	,,	1905	.	59,467,000	,,
,,	,,	,,	1906	.	56,477,000	,,
,,	,,	,,	1907	.	69,154,000	,,
,,	,,	,,	1908	.	63,655,000	,,
,,	,,	,,	1909	.	62,563,000	,,
,,	,,	,,	1910	.	74,106,000	,,
,,	,,	,,	1911	.	80,182,000	,,
,,	,,	,,	1912	.	73,302,000	,,

The United States Mint reports give the recent production as follows :

For the financial year commencing in			1913	.	70,703,828	ozs.
,,	,,	,,	1914	.	27,546,752	,,
,,	,,	,,	1915	.	39,570,151	,,
,,	,,	,,	1916	.	22,838,400	,,
,,	,,	,,	1917	.	35,000,000	,,
,,	,,	,,	1918	.	62,517,000	,,

CHAPTER IV

PRODUCTION OF CENTRAL AND SOUTH AMERICA

The Incas—Pizarro's advent—Spanish viceroys—Peruvian independence—Chief mining districts—Scarcity of fuel—Decay of mining industry — Inaccessibility of mining regions — Paper currency—Original inhabitants cultured—Ancient myths—Silver flowers and fruit—Serons and criminals—Colombian output—Electrolytic plant—Ancient moulded silver ware—Potosi in Bolivia—*Purchas His Pilgrims*—Discovery of mine—Huanchaca Mine—Huge output—Outburst of heated water—Fine situation.

THE production of the Central and South American States is considerable. The district now covered by the Republic of Peru deserves prominence owing to the importance its output attained almost immediately after it came into touch with European civilisation.

Some three hundred years before the first visit of the Spaniards, which took place in 1527 A.D., the Incas settled in the Cuzco Valley. Huasca and Atahualpa, the two sons of the late Inca Huayna Capac, were engaged in a fierce struggle for the succession when the Spaniards invaded the country.

Pizarro wended his way to Cajanarca, the capital, on the 15th November 1532, accompanied by only 183 men. The course of events was similar to that recorded in the case of Mexico. The Spanish commander advanced in the guise of a friend, obtained the confidence of the native emperor, Atahualpa (who had been victorious over his elder brother), and then seized his dupe and held him prisoner. Whereupon the natives set Manco, another son of the late Inca Huayna Capac, upon the throne, but his authority was rendered merely nominal by the energetic Spaniards, whilst Pizarro and his lieutenants parcelled out the territory amongst themselves.

Internal quarrels, provoked by jealousy, broke out between the foreigners, and also risings on the part of the natives against the alien domination. In the course of time Pizarro and many of his rival officers came to grief, either by assassination or deliberate execution. Ultimately the King of Spain administered the new colony by viceroys, who proved successful in defeating the rebellious elements, and in consolidating the power and authority of Spain, and Inca Manco was pensioned. The nominal rule of the race continued for a while, until in the year 1571 the viceroy, impelled by fear of rebellion, ordered Tupac Amaru, the last of the Incas, to be beheaded in the Square of Cuzco.

The geographical position of Peru rendered it the centre of Spanish power, and for this reason it was the last of the Spanish American colonies to free itself from the yoke, when the Spanish colonial empire fell to pieces. Viceregal rule continued from 1569 to 1820. The landing of a military force from a fleet commanded by Lord Cochrane, and officered by Englishmen, led to the withdrawal of the last viceroy, and on 28th July 1821 the independence of Peru was proclaimed.

A glance at the map reveals Peru as a congeries of mountains. The principal mining districts are to be found in the high tablelands or upon the slopes of the Andes. The early days of mining proved marvellously productive. The Cerro de Pasco district is said to have produced £40,000,000 worth of silver out of its 342 mines between the year 1784 and 1889, and even as late as 1906 produced £973,000 worth in the twelve months. There is a scarcity of fuel on the tablelands, and various substitutes have had to be called into use, such as the dried dung of the llama, a grass called ichu, and a species of woody fungus.

The Incas were primarily an agricultural and pastoral people, but the quantities of the precious metals which formed the treasure of the Incas, and were visibly displayed for the purpose of ornament, proved that mining must have been practised extensively. Probably only the richest deposits of the precious metals were

worked; and, as in the case of other primitive races, anything like scientific treatment of ores was unknown. The Spaniards, as usual in their American undertakings, lost no time in prospecting and mining, wherever it seemed worth while, with the assistance of the aborigines as slaves. Most of the silver was derived from red oxides, sulphides, and silver-lead.

Subsequent to the revolt of the colony from the Spanish Crown, mining enterprise languished, and the country remained in an unsettled condition until the end of the nineteenth century. Free introduction of capital, without which modern mining development is impossible, depends upon a state of security. The absence of peaceful conditions, and a legacy of difficult mining legislation promulgated during the Spanish régime, brought the mining industry almost to a standstill. An attempt was made in 1876 to mend matters by the enactment of new mining laws, but the war with Chile again postponed fresh legislation. Ultimately a new mining code became law in 1901, and gave such impetus to the industry that no less than 12,858 mining claims were taken up in 1907, at a cost of £3 per annum per claim, for which moderate sum the State grants sole ownership. In 1918 the production of Peru amounted to 10,800,000 ounces.

The fact that mining enterprises in South America have been abandoned is by no means any criterion that good mining propositions do not exist, as considered in the light of the present day. The old Spanish miners were clever and performed wonders with the very indifferent means at their disposal; they had but primitive tools, and no adequate means of dealing with water when it incommoded their operations. For these reasons their powers were limited, and they were compelled to relinquish mines as unworkable after they had sunk shafts to a certain depth, although modern engineers with up-to-date appliances easily obtain handsome results. The inaccessibility of the mining districts proved a great drawback before the invention of railway locomotion. The time, labour, and expense involved in trans-

A—Sledge with box placed on it. B—Sledge with sacks placed on it. C—Stick.
D—Dogs with pack-saddles. E—Pig-skin sacks tied to a rope.

REMOVING ORE.

Reproduced from 'AGRICOLA,' Published 1556 *A.D.* (*p. 36.*)

porting ore by mule-back over difficult mountainous country can be well conceived.

Notwithstanding the great quantity of silver extracted from its soil, Peru found a difficulty in maintaining an effective metallic currency, owing to the constant emission of paper money. In 1898 the currency was placed nominally upon a gold basis, with subsidiary coins in silver and copper.

It is possible from old Spanish records, and from objects discovered in recent years, to gain a good idea of the history of Peru. As to the dim past, all the people of Central and South America possessed one legend in common. It concerned a cultured white hero who appeared suddenly, instructed them in the arts and industries, and disappeared in the same dramatic fashion as he came. The patterns of textiles, and the designs upon pottery and metal, sometimes show a close resemblance to those of China, and suggest that a shipwrecked mariner from that far-off country may have provided the basis of this tale.

Mr. Douglas Carruthers, in his book entitled *Unknown Mongolia*, throws light upon this legend, and attributes the introduction of metal working into North America to Mongolian travellers—a vast journey indeed, but a feat not much more difficult than the invasion of the heart of Europe by the same adventurous nomads. He states :

'From contemporary history we learn that in the days of Herodotus (fifth century B.C.) these Yeniseians were in the Bronze Age, whilst four centuries later Strabo remarks that they used gold and bronze, a little iron, but no silver. The relative ages of culture as compared with those in Europe are of interest. The Tartars were in the Iron Age when visited by mediaeval travellers, yet the Tunguses of Siberia to this day use stone arrow-heads. The influence of the Yeniseians may have been very far-reaching. According to tradition, the working of gold, silver, copper, and bronze was introduced into North America by foreigners; and the evidence that North America has received its population from Asia is fairly well established, on the strength of the physical,

social, and linguistic characters of the aborigines, which are so closely allied to those of the Mongolian tribes in Siberia. May not the introducers of the art of metal-working have been these same skilled mineralogists from the banks of the Yenisei?'

The artistic workmanship of the ancient Peruvians, whether in stone, pottery, or metal, is wonderful, and a very characteristic strain of humour is shown in the shape and modelling of the human features. Many of these articles are extant in the two former materials, but few objects in the precious metals have survived. Ancient Spanish writings show that a civilisation of a refined type must have existed at the time of the Conquest. Gold and silver were cast, soldered, hammered, and inlaid. The Inca was said to have possessed gardens in which trees and plants were imitated in the precious metals, portrayed with leaves, flowers, and fruit, some beginning to sprout, others half grown, and others in maturity. The flower, or any part not green in colour, was fashioned in gold, the rest in silver. Unfortunately most of their artistic treasures were thrown into the melting-pot for the sake of the metal, and the work discovered in tombs is far less artistic. The objects consist occasionally of silver cups, fashioned in the shape of the human face. Considering the wealth of silver extracted from Peruvian soil during the time of the Incas and the Spanish domination, silver relics in the country are remarkably rare.

A hundred years ago, great quantities of silver used to arrive from South America as an amalgam with mercury. The method of packing was remarkable. The metal, in lumps of about two thousand ounces weight, was sewn up in fresh untanned cattle skins, and the completed parcel was called a 'seron.' As the skin dried it shrank, so that it fitted the contents like a glove. The smell of the decomposing hide was always foul and disgusting, and hung for days afterwards about the premises where the seron was emptied. The same system of packing was used in South America for criminals, and probably for captured prisoners as well. The victims were

tied up securely in raw skins, and exposed to the torrid heat of the sun. The suffering caused by the contracting skin, until death mercifully released them from their agonies, can be better imagined than described.

The history of Colombia resembles that of Peru, but the first visit from the Spaniards occurred some years earlier. Alonzo de Ojeda touched the coast in 1499. After he had made his report to the home authorities, Gonzalo Jimenez de Cuesada was despatched in 1536 with an expedition which pierced to the interior, and captured Bogota. After the middle of the century Spanish power was established firmly over the new colony, which was named New Granada, and ruled by an officer styled President until 1718. From that year onward a viceroy took charge until 1811, when an insurrection broke out, which secured independence for the country thirteen years afterwards. New Granada originally embraced Venezeula and Ecuador, both of which subsequently became independent republics.

The value of the silver which was extracted from Colombian territory is difficult of ascertainment, owing to the lack of proper records. It has been given by a native expert as £6,600,000 up to the year 1886. The output fell off during the civil wars, which, as in the other old Spanish colonies, broke out soon after independence was declared.

Towards the end of the nineteenth century modern mining methods were introduced, including the establishment of an electrolytic plant at Medellin. A serious drawback to mining in this State is the unhealthiness of those districts which happen to be most rich in silver.

The output seems again upon the decline. The total fell from about 3,700,000 ounces in 1908 to 325,000 in 1918.

Long prior to the Spanish Conquest, the ancient Colombians were adepts at fashioning ornaments and utensils out of precious metals. The design was moulded in wax upon a core of clay, over which a coat of clay was plastered; the two clay portions were kept apart by small pieces of wood, so as to be independent of the wax. The

concoction was baked, the wax melted and allowed to flow away. Molten metal was poured into the spaces thus left vacant. Many beautiful works of art were obtained by this ingenious method. The metal employed was a compound of gold, silver, and copper.

The history of Chile does not embrace an ancient civilisation like that of Mexico and Peru. The Spaniards numbered the territory amongst their colonies, and it secured its freedom about the same period as that of the adjoining states. Atacama is the province richest in silver, whilst native silver, that is to say silver unmixed with other metals, has been found at Caracoles, but the State has never figured largely as a producer, and most of its ore has been exported for treatment elsewhere. In 1894 the fine metal extracted was about 4,800,000 ounces, in 1912 870,000 ounces. In 1918 the output of Chile and Bolivia combined was over 2,225,000 ounces.

Bolivia contains the Potosi Mine, discovered in 1545, which is said to have turned out fabulous riches. In *Purchas His Pilgrims*, Joseph Acosta thus enlarges upon its discovery :

' The Mountaine or Hill of Potozi so famous, is situate in the Province of Charcos, in the Kingdome of Peru, distant from the Equinoctiall toward the South, or Pole Antartike, one and twentie degrees and two thirds : so as it falls under the Tropicke, bordering upon the burning Zone, and yet this Region is extremely cold, yea, more than old Castile in the Kingdome of Spaine, and more than Flanders it selfe, although by reason it should be hot or temperate, in regard of the height and elevation of the Pole where it is seated. The reason of this so cold a temperature, is the height of the Mountaine, whereas cold and intemperate winds continually blow, especially that which they call Thomahavi, which is boisterous and most cold. It raines most commonly in June, July, and August. The ground and soile of this Mountaine is drie, cold and very unpleasant, yea, altogether barren, which neither engenders nor brings forth any fruit, grasse, or graine ; it is naturally unhabitable, for the intemperature of the Heaven, and the barrenesse of the Earth. But the force

A MINING CAMP. (*p. 40.*)

of silver, which drawes unto it the desire of all things, hath peopled this Mountaine more then any other place in all these Kingdomes, making it so fruitful of all kinds of meates, as there wants nothing that can be desired, yea, in great abundance; and although there be nothing but what is brought by carriage, yet every place abounds so with Fruit, Conserves, exquisite Wines, Silkes and all other delicates, as it is not inferiour to any other part. This Mountaine is of colour darke red, and is in forme pleasing at the first sight, resembling perfectly the fashion of a Pavilion, or of a Sugar-loafe. It exceeds all other Hills and Mountaines about it in height. The way whereby they ascend, is very rough and uneven, and yet they goe upon horse-back. It is round at the top, and at the foot it hath a league in circuit. It contains from the top to the bottom 1680 common yards, the which reduced to the measure of Spanish leagues, makes a quarter of a league. At the foot of this Mountaine there is another small Hill that riseth out of it, in the which there hath beene sometimes mynes of metall dispersed, which were found as it were in purses, and not in fixed or continued veines; yet were they very rich, though few in number. This small Rock was called by the Indians, Guayna Potozi, which is yong Potozi; at the foot whereof begins the dwelling of the Spaniards and Indians, which are come to the riches and worke of Potozi, which dwelling may containe some two leagues in circuit, and the greatest traffick and commerce of all Peru is in this place. The mynes of this Mountaine were not digged nor discovered in the time of the Inguas, which were Lords of Peru, before the Spaniards entered, although they had digged and opened the mynes of Porco, neer to Potozi, distant only six leagues.

'An Indian called Gualpa, of the Nation of Chumbibilca, which is a Province of Cusco, going one day to hunt for Venison, passing towards the West hither the beast was fled, hee began to runne up against the Rock, which at that time was covered and planted with certaine Trees they call Quinua, and with thicke bushes, and as he strived to get up a way which was somewhat

rough and uneasie, hee was forced to lay hold on a branch, which issued from a veine of a silver myne (which since they have called Rich) which hee pulled up, perceiving in the hole or roote thereof, metall, the which he knew to be very good, by the experience hee had of the mynes of Porco: and after finding upon the ground certaine pieces of metall, which lay broken and dispersed neere to this veine, being scarce well able to judge thereof, for that the colour was spoyled and changed by the Sunne and raine; he carried it to Porco to trie by the Guayras (which is the triall of metall by fire) and having thereby found the great riches and his happy fortune, he secretly digged and drew metall out of this veine, not imparting it to any man, untill that an Indian called Guanca, of the valley Xaura, which is upon the borders of the Citie of Kings, who remayning at Porco neere unto Gualpa of Chumbibilca, perceived one day that hee made a refining, and that his Wedges and Bricks were greater then such as were usually made in those places: and also increasing in his expence of apparell, having till then lived but basely. For this reason, and for that the metall his Neighbour refined was different from that of Porco, hee thought to discover this secret, and wrought so, that although the other kept it as secret as hee could, yet through importunitie he was forced to carry him unto the Rocke of Potozi, having enjoyed this rich treasure full two moneths. And then Gualpa the Indian willed Guanca for his part to take a veine, which he had discovered neere to the rich veine, which at this day is called the veine of Diego Centeno, that was not lesse rich, but more hard to digge, and to draw forth; and so by agreement they divided betweene them the richest Rocke in the world. It chanced after, the Indian Guanca finding some difficultie to digge and draw forth his metall, being most hard, and the other Gualpa refused to impart any of his myne unto him, they fell at debate; so as Guanca of Xaura grieved therewith, and with some other discontents, discovered this secret unto his master called Villareol a Spaniard, who then remayned at Porco. This

Villareol, desirous to understand the truth, went to Potozi, and finding the riches his Yanacona or servant had discovered unto him, caused the Indian Guanca to be inrolled, undertaking with him the said veine, which was called Centeno, they call it Undertaking, that is as much as to note and marke the myne, and so ground in circuit for him, which the Law graunts unto those who discover any myne, or unto those that digge them: by means whereof, having discovered them to the Justice, they remayned Lords of the myne, to digge and to draw forth the silver, as being their owne, paying only their duties unto the King, which is a fift part. So as the first discoverie and inregistring of the mynes of Potozi, was the one and twentieth of April, in the yeere of our Lord 1545, in the Territorie of Porco, by the said Villareol a Spaniard, and Guanca an Indian. Presently after discovered another veine, which they called the veine of Tinne, the which is very rich, although it be very rough and very painful to worke in, the metall being as hard as flint. Since the thirtie day of August in the same yeere 1545, the veine called Mendieta was inrolled, and these are the foure principall veines of Potozi. They say of the rich veine, the first that was discovered, that the metall lay above the ground the height of a Lance, like unto Rocks, raysing the superficies of the Earth, like unto a crest of three hundred foot long, and thirteene foot broad, and that this remayned bare and uncovered by the deluge, this veine having resisted the violence and force of the water, as the hardest part. The metall was so rich as it was halfe silver, and this veine continued in his countie fiftie or threescore Stades (which is the height of a man) and then it fayled. Presently after that the discoverie of Potozi was knowne in Peru; many Spaniards, and the most part of the Bourgeois of the Silver Citie, which is eighteene leagues from Potozi, came thither to take mynes: yea, there came many Indians from divers Provinces, especially the Guayzadores of Porco, so as within a short space it was the best peopled habitation of all the Kingdome.'

The Huanchaca Mine is now the most important in

the State, and is called the Queen of South American Mines. The presence of the rich deposits is said to have been discovered to a prospector by an Indian to whom he had rendered a service. The minefield consists of ten groups, of which the history has been somewhat chequered. Operations were commenced towards the end of the eighteenth century, but the Wars of the Independence led to an abandonment before many years had elapsed. In 1832 working recommenced, and was pursued with uncertainty and lack of vigour until the year 1873, when the present Huanchaca Company was formed, with a capital of $6,000,000, raised in 1890 to £1,600,000. During the twenty-eight years 1873-1901, 4,250,000 kilograms, or an average of about 150,000 kilograms a year, were produced. Towards the end of the last century a mining calamity of the first magnitude occurred. The galleries were inundated by a rush of hot water charged heavily with carbonic acid gas from the abyss below. The disaster was accompanied by a failure of one of the richest veins, and the production fell off considerably, so that in 1909 the output was returned as only 48,550 kilograms. Thanks to powerful pumps imported from England, the water inflow was abated, and the output is now upon the upgrade. The vein has been recovered. A railway, owned by the mine, rises sharply from 3600 to 4200 metres, revealing a magnificent view over what was once an inland sea, now a vast field of salt sparkling in the brilliant sunshine. Around the vicinity lie smoking volcanoes, and hoary-headed mountains stretching far away to the frontiers of Chile and Peru, a most imposing sight. The Company employ 12,000 Indians, whose pay ranges up to $9 a day. The ore is very rich, 130 ounces to the ton, and is sorted by women.

The annual production of Bolivia in 1845 was estimated as from 700,000 to 900,000 ounces. The total production of Bolivia in 1918 was 2,435,000 ounces.

The metal must have found its way from the producing States to far distant parts of the continent, for the prehistoric Patagonians appear to have used silver

earrings and pins to fasten the women's clothing, composed of an apron and a cloak. The influence of Peruvian metal-working has been traced as far as the districts bordering the Amazon. At Rio Grande do Sul, in Brazil, silver discs of ancient make have been found, pierced in the middle, probably for attachment to some article worn upon the person.

CHAPTER V

PRODUCTION OF THE UNITED STATES OF AMERICA

Natural resources and human energy—Mountain ranges—Desert flats —Courage and perseverance—Indian tribes—Accidental discovery of Comstock Lode—Hardships of early miners—An eloquent surveyor— A mine for a song—Systematic road-making—Aladdin's cave— Dome 400 feet high—Chance and the miner—Pauper's grave for the discoverers—Water 170 degrees Fahr.—The Comstock Lode peters out—Cause of bimetallism abandonment—Rifle contests between rival miners—Emigrants murdered by Indians—Remarkable mine in Colorado—The greatest producing mine in the world—Chief producing mines in 1911—Output of each State—Total U.S.A. production.

THE mining industry of the United States of America is a fine example of what can be accomplished by a virile people, equipped with ample resources of scientific skill. Development has been continuous and ever widening in its scope. Guarded happily from civil strife and external interference, miners in this country have had no check to their enterprises, save the barriers imposed by Nature upon human progress. These have been considerable. Some idea of these difficulties can be gathered from a consideration of the physical characteristics of the territory in which the mineral wealth of the United States is centred.

From the Arctic Sea to Southern Mexico, alongside the Pacific Ocean, stretches a chain of mountain peaks and high tablelands. Commencing 400 miles in width, the tract of rocky heights expands to 1,000 miles, and contracts again to 400 miles. The wide centre is called the Great Basin, a dismal barren area. A striking description of this is given by Mr. Clarence King in his book upon *Geological Explorations of the Fortieth*

TYPICAL MINERS. (p. 46.)

Parallel. 'The depressions of the ring are dreary reaches of desert, where fields of sand alternate with alkaline plains, where, in the brilliant dry air, the eye may range over expanses of desolate lowland, naked and devoid of all vegetation, except those blighted-looking forms of life, the sages, which rather intensify than relieve the deathly aspect of the scene. The Central Plateau region is somewhat more favoured; occasional grassy valleys interrupt the sage plains, and the mountains are less sterile and forbidding. Trees, which were almost wholly absent in the lowland, occur on the loftier ranges; and near the perpetual snow, which here and there caps the higher summits, an extraordinary fertility is developed.'

The Sierra Nevada bars the West with an elevation of some 10,000 feet, whilst toward the east the Wahsatch rises abruptly. Within this enormous range are to be found the minefields of Arizona, Middle Nevada, and Central Idaho, where silver associated with many base metals has been derived in vast quantities. In Utah and Western Montana the combination is usually of silver and lead. Exposed to great alternations of climate, far from the comforts of civilisation, often hundreds of miles from anything that could be described as home-life, intrepid prospectors pierced the rocky fastnesses, the advance guard of a hardy mining population, upon whom devolved the task of extracting from Nature her secreted treasure. These men were rough in visage and in attire. The fierceness of the elements to which they were constantly exposed took care of that. Rough in manner and language too, but none the less worthy of respect for that undaunted courage with which they won successes over the wild forces to which they were opposed. Nor did they have to combat natural obstacles alone. Indian tribes resented invaders of their domains, and the life of a prospector was ever in his hand.

Men of this type were responsible for an event in 1859 which affected powerfully the fortunes of the world at large. The fascinating history of this epoch-making event was on this wise:—Just a decade after the

discovery of gold in California, and during the powerful impetus which that event gave to adventurous spirits to seek similar treasure of precious metal, two miners, Irish by birth, Patrick M'Laughlin and Peter O'Riley, pierced a gulch of the Carson River Valley in search of water. The earth thrown out was yellow sand, commingled with quartz and black rock, which to the eye appeared valueless. Possessing, like all pioneers in those days, the instinct of a prospector, they washed some of the dirt in a pan, and were overjoyed to find a residue of gold. Had not traces of gold been found in this accidental fashion, the Great Comstock silver lode would not have been seen by the eye of man.

A man named Henry Comstock, a restless lazy trapper and fur-trader, chanced to peg out a claim close by the two Irishmen. Watching his neighbours, he spotted, with his greater knowledge, the rich value of the black rock, which they dumped aside as worthless, and by pure bluff induced them to waive their rights and be content with the surface gold which they obtained. Pieces of this black rock were assayed at Placerville, and reported to contain £600 in silver and £175 in gold in the ton. Instantly news spread abroad, and fortune hunters flocked through the passes of the Sierra on the way to Mount Davidson in Western Nevada, where the lode lay.

In the words of the U.S. Geological Survey: 'Rough-haired mustangs, gaunt mules, and sure-footed little "burros" climbed the sierras loaded with stacks of blankets, bacon, flour, kettles, pans, shovels, and other articles of a miner's outfit. The ravines and brown hillsides were dotted with a restless swarm. Thin wreaths of smoke rose from hundreds of little camp-fires on the hills, and the sharp strokes of falling picks startled the lizards from their hiding-places in the rocks.'

Bitter were the sufferings of the ill-provided miners during that fell winter, amid the hurricanes and blizzards of the tented camps. The U.S. authorities continue: 'The treasures of Potosi, the ransom of Montezuma, the deep-laden galleons of Spain, and a host of

vague memories were awakened by the sight of the masses of bullion on exhibition at San Francisco. The fever spread rapidly: merchants closed their counting-houses and clerks left their desks: sailors deserted their ships and mechanics their workshops. Miners swelled the migration not unlike the train of children drawn on by the entrancing notes of the Pied Piper of Hamelin. How to reach the silver ledges was the absorbing thought—far beyond the sierras the riches of their dreams appeared before them, and neither inexperience nor poverty could deter such passionate pilgrims from joining the odd troop which began its march over the mountains while the passes were impassable.'

The writer of the Survey may be congratulated upon his descriptive powers. He had certainly a subject worthy of his pen, for in the year 1863 Nevada produced, mainly from the Comstock Lode, no less than £5,000,000 worth of bullion. One mine upon the lode, the Gould and Curry Mine, bought from its original owners for an old horse, a bottle of whisky, some blankets, and 2500 dollars in cash, was valued at 7,600,000 dollars four years after the deal.

The energy of the authorities overcame with rapidity the difficulties arising from the isolated district in which the lode was situate. The U.S. Survey states that a fine highway was made across the sierras: 'The steepest grades were cut down and smoothed. Gullies and ruts were filled with compact layers of broken stones and loam. Bordering rocks were blasted away or rolled aside, and the narrow, dangerous, wretched trail, scarcely fit for the passage of a sure-footed pack-mule, became a broad, compact, well-graded highway, which might fairly be likened to an old Roman road. The turning points of the road were broad platforms built up from the hillsides with outward-curving base walls of well-joined rocks. When snowdrifts blocked the passage in winter, a well-equipped party of men and horses sallied from every station and cleared the way with extraordinary dispatch, while watering carts passing from station to station laid the dust in summer, so that the road was like

a well-kept avenue in a mountain park.' Thus the wild rush for wealth went hand in hand with civilising influences, which created lasting advantages of transit out of the silver treasure found in the vicinity.

In October 1873 a syndicate of miners found the great ore body, subsequently called the Big Bonanza. 'Of its magnitude and richness,' writes Mr. Lord, 'all then were ignorant. No discovery which matches it has been made on this earth from the time when the first miner struck a ledge with his rude pick until the present. The plain facts are as marvellous as a Persian tale, for the young Aladdin did not see in the glittering cave of the genii such fabulous riches as were lying in that dark womb of the rock. . . . The wonder grew as its depths were searched out foot by foot. The bonanza was cut at a point 1167 feet below the surface, and as the shaft went down it was pierced again at the 1200-foot level; still the same body of ore was found, but deeper and wider than above. One hundred feet deeper, and the prying pick and drill told the same story; yet another hundred feet, and the mass appeared to be still swelling. When, finally, the 1500-foot level was reached, the ore richer than any before met with was disclosed, the fancy of the coolest brains ran wild. How far this great bonanza would extend none could predict, but its expansion seemed to keep pace with the most sanguine imaginings. To explore it thoroughly was to cut it out bodily; but the systematic search through it was a continual revelation. . . . . The scene within this treasure-chamber was a stirring sight. Cribs of timber were piled in successive stages from basement to dome four hundred feet above, and everywhere men were at work in changing shifts, descending and ascending in the crowded cages, clambering up to their assigned stopes with swinging lanterns or flickering candles, picking and drilling the crumbling ore, or pushing lines of loaded cars to the stations at the shaft. Flashes of exploding gunpowder were blazing from the rent faces of the stopes ; muffled roars echoed along the dark galleries, and at all hours a hail of rock fragments might be heard rattling on the floor of a level, and massive

lumps of ore falling heavily on the slanting pile at the foot of the breast. Half-naked men could be seen rushing back through the hanging smoke to the stopes to examine the result of the blast and to shovel the fallen mass into cars and wheelbarrows. While some were shovelling ore and pushing cars, others, standing on the slippery piles, were guiding the power drills which churned holes in the ore with incessant thumps, or cleaving the softer sulphurets with steel picks swung lightly by muscular arms. . . . Roman gladiators were scarcely better fitted for their contests in the arena than those Comstock miners for their labours in the heart of the bonanza. All were picked men, strong, young, and vigorous, fed on the choicest food which the Pacific Coast affords, and paid the highest wages earned by any miners in the world. . . . In the hot levels all clothes were laid aside, except a simple waist-cloth, and shoes which protected the feet from the scorching rocks. Balanced alertly on wet crumbling heaps of ore, with muscles swelling like flesh waves at every swing of the well-balanced picks, they became models for a sculptor. Their hot blood glowed beneath a skin whitened by a life in dark rock-chambers often dripping with water and reeking with vapour.'

For three years the Big Bonanza yielded £600,000 a month! and up to 1899 the Company which owned it turned out ore worth £26,500,000, of which half became the perquisite of the fortunate proprietors.

The element of chance, which ever attached to a miner's career, haunted each of the three men whose names have been mentioned in connection with the Comstock Lode. M'Laughlin, after a life of continual misfortune and hard work, died in hospital so poor that his body was laid in a pauper's grave. O'Riley, his brain turned by disappointing hopes, wore himself out in driving a tunnel single-handed into a barren hillside. Goblin voices lured him on until at last his crazy tunnel collapsed, and his crushed body was taken out to breathe a few hours and then die. Comstock, at one time rich beyond count, lost all his gains by speculation.

Finally he lost reason as well, and still in fancy owner of the lode and all its vast potentialities, shot himself, and his inglorious career was terminated by burial in a nameless grave beneath the wild wastes of Montana.

The mines upon the lode were first opened in 1859, and on 1st June 1880 the total length of the shafts and galleries in the different mines had already exceeded 150 miles. The thickness of the lode varied from 20 to 60 feet.

A most remarkable phenomenon in connection with the mining in this district is the intense heat which prevails in the lower levels. In the Yellow Jacket shaft a large body of water was struck at a depth of 3065 feet, of which the temperature was 170 degrees Fahr., and was impregnated with sulphuretted hydrogen. Whether this was owing to some connection with subterranean fires, or to the action of chemical processes, was never decided by experts.

In 1876, the ninth census year, the silver yield of the Comstock was worth about $20,600,000. In the tenth census year, the yield of the whole district had fallen to about $3,800,000, whilst when the eleventh census was taken in 1889, the output had sunk to $150. Owing to the heavy fall in the price of the metal, there was no longer the same profit in extracting silver, and both prospecting and mining industries languished in consequence. From the time when the Comstock Lode was first worked in 1859 up to 1st June 1880, a quantity of silver valued at $175,000,000, or say £36,000,000, rewarded the diligence of the miners. In the nine years following, during which the lode—in miners' parlance—petered out, a further amount worth $20,000,000, or over £4,000,000, was added to the total magnificent output of the district.

These phenomenal finds of silver had far-reaching results. They were the partial cause of the abandonment of bimetallism by all the Great Nations one after the other—with the exception of China—which is now hesitating upon the brink of a similar step.

Mr. Eissler, in his work entitled *The Metallurgy of*

Silver, states that after the Comstock Lode, 'The next discovery of silver of any note was the deposit on War Eagle Mountain, in Idaho Territory, and in spite of the distance of the spot from any centre of supply, located as it was in an inhospitable region, difficult of access on account of roving Indians, a most prosperous mining district quickly sprang up.

'Most noted among the mines of the district were the Golden Chariot and Ida Elmore. Their working shafts were barely 100 feet apart; but the short intervening piece of ground contained such riches that both mines coveted its possession, and came into frequent collision as to the exact boundary line. Their disputes culminated in armed contests deep underground, men armed with repeating rifles being sent down the shafts to protect the miners from behind breastworks built up in the tunnels and drifts, while the diggers were blasting out the rich ores from the disputed bonanza. As the working galleries of the mines were connected, several men were killed and wounded before this unsatisfactory state of affairs was brought to an end. It was costly work, for the companies had to pay their "fighters" from £100 to £200 a day for doing patrol duty in the mines.

'Matters were brought to a crisis by the killing of Mr. Marion Moore, the largest shareholder of the Ida Elmore, and the country became terrorised. The governor of the territory came upon the scene with a battalion of United States soldiers, and taking possession of the mines, proclaimed martial law, and restored order. That was in March 1868. This was not the only instance of a bloody conflict for the possession of rich ore, similar scenes having been enacted in other districts.

'Now followed discovery after discovery, and news reached us from the sandy deserts of Nevada that rich silver ore had been found in the Reese River regions. From that point a party of prospectors started, in 1869, for the Burnt Wagon district, seventy miles north-west, a country which took its name from the remnants found there of burnt wagons, which had belonged to a party of

emigrants attacked and killed by Indians, the latter finishing their work by burning the wagons. Near by was a spring, and here the party camped. Their search for minerals was rewarded by a most magnificent find of bold and rich outcroppings, which were located on what they designated "Mineral Hill." Their reward was the sum of £100,000, which they received from the Californian purchasers. When these mines were sold to an English company, in 1870, I was appointed metallurgist of the works. My engagement at this concern gave me the opportunity to examine and study the Eureka Silver-Lead Mines, sixty miles farther south and thirty miles beyond the then celebrated White Pine Mines; and, to crown the brilliant silver period, the famous Pioche Mines were "located" by some soldiers while in pursuit of hostile Indians, another hundred miles farther on in the south-eastern corner of Nevada. Meanwhile, and simultaneously, the western escarped ridges of the bold Wahsatch ranges were being closely searched. There large bodies of silver-lead were uncovered, recalling the Eureka Mines in extent. Such mines as the Emma, Flagstaff, and many others were also being developed, and the completion of the great Central and Union Pacific Railways, which crossed the continent, assisted the early explorers in the active prosecution of their enterprises.

'Meanwhile also, explorations were pushed farther south, and in 1874 the discoveries at Panamint, in Surprise Cañon, Inyo County, attracted me to that region. While there I had occasion to investigate the New Coso Silver-Lead Mines, the Argus Range with its noted Modoc Mines, Wild Rose Springs and adjacent territories, including Death Valley, some portions of which are 110 feet below sea-level.'

The possibilities of mineral wealth in Utah were investigated soon after the military occupation of that territory. General Connor released some of his men in 1863 for the purpose of prospecting the district as soon as he had established Fort Douglas. In 1866 some attempts were made at Stockton to smelt lead-silver ore,

SCENE IN A MINING DISTRICT (*p. 54.*)

but it was not until 1870 that serious efforts were made to work mines; but such was the activity, that before the end of 1871 wagon trains thronged the main thoroughfares, carrying loads of ore 200 miles or more to the railhead. Between 1871 and the close of 1887, 59,000,000 ounces had been yielded from active mines in this State. The falling price of silver tended to reduce the margin of profit per ton, but the introduction of better appliances, and more skilful treatment of the ore, made up the deficit. The Emma Mine, which was first worked in 1870, and proved rich in high-grade ore at 90 feet depth, ceased producing in 1876, but the belt, of which it formed part, extends far across the adjoining country. By the aid of diamond drills it is now endeavoured to trace the lost lode, which had been as effectually lost as if the touch of a magician's wand had dissolved it into thin air.

The mineral wealth of Arizona was discovered about the year 1878, when a beginning was made in the Tombstone district, which lies forty miles north of the Mexican line.

From its earliest mining days, Idaho has been steadily prolific. The output has grown from 3,300,000 ounces in 1894 to 9,396,009 in 1918. The possibility of deposits in Alaska, that vast and inaccessible expanse of territory, cannot be said to have yet been probed. California is very rich in other metals, which are derived from no less than eleven hundred mines, but comparatively few yield any silver. Texas also is but a poor producer. The Rocky Mountains area is said to be rich in silver ore, but mining is not yet in operation.

Turning to Colorado, the Bassick Mine presents some remarkable features, which single it out as worthy of special attention. It is situated near the centre of a small rounded hill, of which the greatest diameter at the base is 1200 feet, whilst its height above the adjoining levels does not exceed 200. The attention of the visitor is attracted at once to the unusual method in which the ore is arranged, namely, in concentric layers around a nucleus, which may be the size of a boulder of two feet diameter, or a pebble not half an inch across.

Around each of these water-worn fragments are gathered ores in succession, each class of ore forming a separate stratum. Usually three, sometimes four layers, quite distinct, are attached firmly to each other, but show a perfectly visible line of separation. The inner stratum, mostly sulphides of zinc, antimony, and lead, assays 60 ounces of silver and 1 or 2 ounces of gold to the ton. The next, lighter in colour, is richer, with 200 ounces of silver and 100 ounces of gold. The third is usually crystalline, and contains an average of 90 ounces silver and 30 ounces gold. The fourth coat, also crystalline, assays about 100 ounces together of gold and silver. Sometimes a fifth layer is found, which is mostly composed of pyrites. The impression left upon the mind is that some mighty force had thrown a number of water-worn stones into hollow space, and that a series of metal envelopes had been placed around each stone by a mysterious hand.

The production of silver in Colorado in 1889 was worth $16,549,274. Although the attention of miners began to be directed rather to gold than to silver, owing to the fall in the value of the latter metal, in 1894 23,236,025 ounces were extracted. The industry subsequently showed depression.

Montana was isolated for a very long period from the Eastern States; the sole means of communication were a long and tiresome coach journey in winter, or a tedious river navigation in the short summer. As a consequence, the mining regions were little known to the outside world, and development was retarded through lack of capital, and other evident causes. By 1894, however, this State had sprung into the second place amongst the States of the Union for silver, and returned 12,820,081 ounces. The total for 1918 exceeded 16,378,263 ounces, of which the Silvertown district, where the Anaconda group of mines is situated, yielded the great bulk. The Anaconda Mine is the greatest producer in the world. A brochure by Messrs. Eugene Meyer Junior and Company states that the output for 1916 of the group of twenty-six mines operated by the

Anaconda Copper Mining Company, is expected to comprise 13,000,000 ounces of silver and 150,000 ounces of gold, whilst by its plant a further 4,000,000 ounces of silver is smelted, the origin of which is elsewhere. The upper reaches of the Missouri River supply the power for the electric appliances by which the plant is worked. By the end of 1916 Anaconda will be using for mining, hoisting, pumping, concentrating, smelting, refining, and railroad traction, 126,000 horse-power, beyond which 153,400 horse-power will be available for other purposes. The history of U.S. Mining is indeed an epic from its earliest days.

The sixteen mines in the United States ranking as the largest producers of silver in 1911, are thus reported by the U.S. Geological Survey, in order of importance:

Rank.	Mine.	Location.	State.
1	Anaconda mines[1]	Butte	Montana
2	Tonopah Belmont	Tonopah	Nevada
3	Tonopah Mining Co.	Tonopah	Nevada
4	Iron Blossom	Eureka	Utah
5	Mace and Burke[3]	Wallace	Idaho
6	Silver King[3]	Park City	Utah
7	Speculator[2]	Butte	Montana
8	Copper Queen[2]	Bisbee	Arizona
9	Bunker Hill and Sullivan[3]	Yreka	Idaho
10	Centennial-Eureka	Eureka	Utah
11	Daly West[3]	Park City	Utah
12	Hercules[3]	Burke	Idaho
13	Montana Tonopah	Tonopah	Nevada
14	Old Jordan-Telegraph[3]	Bingham	Utah
15	Holter (Elkhorn)[3]	Jefferson City	Montana
16	Tonopah Extension	Tonopah	Nevada

[1] From all Butte mines of Anaconda Copper Company.

[2] Copper mines. [3] Lead mines.

Product of silver in the several States and Territories in 1917 *and* 1918, *with the increase and decrease in each for the latter year.*

State or Territory.	Weight.		Increase, 1918.	Decrease, 1918.
	1917	1918		
	Fine Ounces.	Fine Ounces.	Fine Ounces.	Fine Ounces.
Alabama	..	2	2	..
Alaska	1,207,164	802,743	..	404,421
Arizona	6,962,257	6,831,465	..	130,792
California	2,107,107	1,432,812	..	674,295
Colorado	7,291,495	6,900,266	..	391,229
Georgia	..	45	45	..
Idaho	11,402,542	9,396,009	..	2,006,533
Illinois	7,116	8,218	1,102	..
Maine	..	6,338	6,338	..
Maryland	538	164	..	374
Michigan	684,225	516,294	..	167,931
Missouri	63,344	42,214	..	21,130
Montana	14,555,034	16,378,263	1,823,229	..
Nevada	11,217,654	9,931,969	..	1,285,685
New Hampshire	..	691	691	..
New Mexico	1,535,807	773,662	..	762,145
North Carolina	590	100	..	490
Oregon	172,152	129,150	..	43,002
Philippine Islands	12,715	13,000	285	..
South Dakota	190,382	161,232	..	29,150
Tennessee	106,975	105,829	..	1,146
Texas	587,945	579,158	..	8,787
Utah	13,360,905	13,492,555	131,650	..
Vermont	403	4,891	4,488	..
Virginia	4,500	1,814	..	2,686
Washington	266,112	300,000	33,888	..
Wyoming	3,400	1,255	..	2,145
Total	71,740,362	67,810,139	2,001,718	5,931,941
Net decrease	..	..	..	3,930,223

Production of Gold and Silver in the United States.

The production of gold and silver from the mines of the United States since 1792 is shown in the following table.

The commercial value of the silver product is reckoned at the average yearly market price of silver on the New York market.

Product of Gold and Silver in the United States from **1792** *to* **1844**, *and annually since.*

[The estimate for 1792-1873 is by R. W. Raymond, Commissioner of Mining Statistics, and since by Director of the Mint.]

Calendar Years.	Gold.		Silver.	
	Fine Ounces.	Value.	Fine Ounces.	Commercial Value.
		$		$
1792 to July 31, 1834	677,250	14,000,000	Insignificant.	..
July 31, 1834, to Dec. 31, 1844	362,812	7,500,000	193,400	253,400
1845	48,762	1,008,000	38,700	50,200
1846	55,341	1,140,000	38,700	50,300
1847	43,005	889,000	38,700	50,600
Total	1,187,170	24,537,000	309,500	404,500
1848	483,750	10,000,000	38,700	50,500
1849	1,935,000	40,000,000	38,700	50,700
1850	2,418,750	50,000,000	38,700	50,900
1851-1855	14,270,625	295,000,000	193,500	259,400
1856-1860	12,384,000	256,000,000	309,400	418,300
1861-1865	10,716,271	221,525,000	28,810,600	38,674,300
1866-1870	12,225,570	252,725,000	49,113,200	65,261,100
1871	2,104,312	43,500,000	17,789,100	23,588,300
1872	1,741,500	36,000,000	22,236,300	29,396,400
Total	58,279,778	1,204,750,000	118,568,200	157,749,900
1873	1,741,500	36,000,000	27,650,400	35,881,600
1874	1,620,122	33,490,900	28,868,200	36,917,500
1875	1,619,009	33,467,900	24,539,300	30,485,900
1876	1,931,575	39,929,200	29,996,200	34,919,800
1877	2,268,662	46,897,400	30,777,800	36,991,500
1878	2,477,109	51,206,400	35,022,300	40,401,000
1879	1,881,787	38,900,000	31,565,500	35,477,100
Carry forward	13,539,764	297,891,800	208,419,700	251,074,400

Calendar Years.	Gold.		Silver.	
	Fine Ounces.	Value.	Fine Ounces.	Commercial Value.
		$		$
Brought forward	13,539,764	297,891,800	208,419,700	251,074,400
1880 . .	1,741,500	36,000,000	30,318,700	34,717,000
1881 . .	1,678,612	34,700,000	33,257,800	37,657,500
1882 . .	1,572,187	32,500,000	36,196,900	41,105,900
1883 . .	1,451,250	30,000,000	35,732,800	39,618,400
1884 . .	1,489,950	30,800,000	37,743,800	41,921,300
1885 . .	1,538,373	31,801,000	39,909,400	42,503,500
1886 . .	1,686,788	34,869,000	39,694,000	39,482,400
1887 . .	1,603,049	33,136,000	41,721,600	40,887,200
1888 . .	1,604,478	33,167,500	45,792,700	43,045,100
1889 . .	1,594,775	32,967,000	50,094,500	46,838,400
1890 . .	1,588,877	32,845,000	54,516,300	57,242,100
1891 . .	1,604,840	33,175,000	58,330,000	57,630,000
1892 . .	1,597,098	33,015,000	63,500,000	55,662,500
1893 . .	1,739,323	35,955,000	60,000,000	46,800,000
1894 . .	1,910,813	39,500,000	49,500,000	31,422,100
1895 . .	2,254,760	46,610,000	55,727,000	36,445,500
1896 . .	2,568,132	53,088,000	58,834,800	39,654,600
1897 . .	2,774,935	57,363,000	53,860,000	32,316,000
1898 . .	3,118,398	64,463,000	54,438,000	32,118,400
1899 . .	3,437,210	71,053,400	54,764,500	32,858,700
1900 . .	3,829,897	79,171,000	57,647,000	35,741,100
1901 . .	3,805,500	78,666,700	55,214,000	33,128,400
1902 . .	3,870,000	80,000,000	55,500,000	29,415,000
1903 . .	3,560,000	73,591,700	54,300,000	29,322,000
1904 . .	3,892,480	80,464,700	57,682,800	33,456,000
1905 . .	4,265,742	88,180,700	56,101,600	34,222,000
1906 . .	4,565,333	94,373,800	56,517,900	38,256,400
1907 . .	4,374,827	90,435,700	56,514,700	37,299,700
1908 . .	4,574,340	94,560,000	52,440,800	28,050,600
1909 . .	4,821,701	99,673,400	54,721,500	28,455,200
1910 . .	4,657,017	96,269,100	57,137,900	30,854,500
1911 . .	4,687,053	96,890,000	60,399,400	32,615,700
1912 . .	4,520,719	93,451,500	63,766,800	39,197,500
1913 . .	4,299,784	88,884,400	66,801,500	40,348,100
1914 . .	4,572,976	94,531,800	72,455,100	40,067,700
1915 . .	4,887,604	101,035,700	74,961,075	37,397,300
1916 . .	4,479,057	92,590,300	74,414,802	48,953,000
1917 . .	4,051,440	83,750,700	71,740,362	59,078,100
1918 . .	3,320,784	68,646,700	67,810,139	66,485,129
Total .	133,131,366	2,752,067,600	2,328,479,878	1,803,344,429
Grand Total .	192,598,314	3,981,354,600	2,447,357,578	1,961,498,829

A SILVER VEIN.

(*p. 61.*)

CHAPTER VI

PRODUCTION OF CANADA

Productive capacity still unknown—Possibilities concealed by forests—Early mining attempts—Trail refinery—Remarkable discoveries at Cobalt—Formation of rocks—Silver eruptions—The forces of Nature—Railway discovers deposits—Handy situation of minefield—Size of veins—Impregnation by arsenic—Method of mining—Different grades of ore—Production of respective mines—Shrinking output—Pleasant relation between Mining Companies.

THE Dominion of Canada, from its proximity to the United States of America, and from the resemblance of its geological formations, invites comparison with that country with regard to its mineral wealth.

The area comprises 3,729,665 square miles, as compared with 3,617,673 square miles in the case of the United States of America. For many decades the latter country has been inhabited, in some parts closely, by an energetic people, and the possibilities of their territory have been fairly well gauged from a mineralogical standpoint, whilst Canada is to a large extent a *terra incognita*, and awaits eagerly an ingress of immigrants in numbers sufficient to develop its natural resources, and to open up the vast field which lies open to the enterprising prospector.

Undoubted prizes are still to be won by resolute pioneers, prepared to face the hardships which confront them in traversing a tract of plain, lake, and mountain, portions of which are immersed in snow for the greater part of the year, extending 3500 miles in a bee-line from east to west, and 1400 miles from north to south.

One dominating geological feature is the mass of ancient crystalline rocks, which embraces two million square miles within its grasp. It is considered to form the base of a mountain range thrust up from the ocean bed, and since crumbled and eroded until a plateau has been formed from which a few domed eminences occasionally emerge.

Clothed in interminable forest of sombre spruce firs, and harbouring countless lakes and streams, this wide

area, paradise to the hunter, but barren wild to the yeoman, hides in its bosom wealth of nearly every metallic description incalculable in value. It is known by the name of the Laurentian Plateau, and ranges from 500 to 1500 feet above the level of the sea. Here are to be found nickel-copper at Sudbury, gold at Porcupine, and last, but by no means least, the phenomenal silver veins at Cobalt. Previous to the discovery of the latter, silver had been recovered from silver-lead mines in Nova Scotia, and there exists a mine of considerable antiquity in Quebec, which produced 36,392 ounces as late as 1913; but it was not until the year 1904, the year in which the Cobalt Mines in Ontario were discovered, that Canada figured seriously in the list of silver-producing countries.

Silver is derived from lead ore in British Columbia, where mining operations are rather widespread. In East Kootenay there are ore deposits, but the silver contents are low; the same conditions obtain at Sheep Creek and the Blue Bell Mine. In the Slocan district the silver assay pans out about 75 ounces to the ton, whilst at Slocan City itself, native silver is to be found, together with various compounds of silver, amongst which is a little lead. Other districts promise to be useful, namely, the Boundary, near Greenwood, the North Thompson River Valley, and Hazelton on the Skeena. A very up-to-date lead refinery, with electrolytic plant, has been erected at Trail, in British Columbia, where the silver from these mines is separated, as well as a large quantity from the mines in the Cobalt district. Silver is derived from Yukon territory, at present mostly from gold bullion, but many silver-lead deposits exist in that region and will yield well in time to come.

There are several reasons why the consideration of Canada, as a producer of silver, possesses special interest. The dramatic manner in which its contribution from the district of Cobalt, in Ontario, sprang upon the world, the immense size of its annual yield within little more than a decade, the object-lesson as to the evolution of the earth's crust afforded by the study of its mineral formations and the convulsions of Nature in the course of that

stupendous process, render the history of silver mining in Canada not one romance, but a series of romances.

The formation of the silver veins of Cobalt dates back to a period of great antiquity, when the interior of the earth was subject to internal spasms of terrific violence, by which enormous masses of rock were forced through the solid crust long since cooled, upheaving mountain ranges sometimes above, and frequently beneath the level of the sea. The appearance of the plateau, which shelters the metallic treasure of Canada, suggests that water action was at work for an extended period after its creation, for the surface shows signs of disintegration and of erosion. For this reason the silver veins are frequently hidden beneath the soil, and do not possess the great depth which characterises other minefields. It is conjectured that the wild paroxysm which hurled rocky projectiles from the fiery core of the earth, formed cracks, which, through the action of water, were filled up gradually by silver ejected from the same source. Further, it is believed that by the erosion which followed the eruption, a larger portion of the silver has been lost than can be recovered by mining operations, for the silent but all-powerful force of the elements—the heat and the cold of changing seasons, the patter of rain, the constant action of vegetation, as well as the ceaseless activity of those humble organisms whose theatre of work is beneath the soil—continually bedeck and reclothe the earth, which otherwise might wear robes of sombre drab. The geologist and the miner may mourn, but the heart of humanity at large has cause to rejoice that Nature has other ends in view than the disclosure of her buried mineral wealth. Some silver was discovered in Ontario before the year 1904. As early as 1846 the metal was obtained in the neighbourhood of Port Arthur on the shores of Lake Superior, where it was mined from the year 1866 to 1903. The most important vein was found on a small island, from which the mine was called the Silver Islet, which up to its abandonment in 1884, yielded over £650,000 of silver. The work was carried to a depth of 1160 feet. In contrast with this mine, the workings in

the Cobalt Mines are not developed profitably as a rule below 200 feet. This fact presages that the life of the present mines in the latter district will not prove a long one, and that the distant future of the silver-mining industry in Canada will depend upon the discovery of fresh veins.

The bodies of ore which carry values in silver, cobalt, nickel, and arsenic were discovered during the building of the Temiskaming and Northern Ontario Railway. In fact, it may be said that the railway discovered the deposits, as it runs almost over the top of one of the most important veins. The finding of such rich ore within so short a distance of the shore of Lake Temiskaming, a stretch of water which has been a well-travelled route to the north by white men for two hundred years or more, and the deposits being only about four miles from the town of Haileybury, show the possibilities there may be for the discovery of important mineral-bearing areas in the vast hinterland of Ontario, even now but little known.

It is a fortunate circumstance for the easy prosecution of the work that the Cobalt district is situated on the main line of Ontario's Government railway, only 330 miles from Toronto. The main portion of the mines lie within only four miles of this line, but a few isolated mines are situated within a radius of fifty miles from Cobalt itself. Although the veins do not dip down far, they are numerous. They are mostly perpendicular, and vary from a mere crack to an artery of 12 inches or more. Few of the veins are above 20 inches in thickness. The richest vary from 1 to 20 inches. For instance, the Trethewey vein has a thickness of from 6 to 8 inches, while that of the City of Cobalt principal vein is from 1 to 2 inches, and that of the Lawson Mine from 8 to 10 inches in width. A specimen piece of ore will assay one-tenth or one-twentieth pure silver, and large fragments of almost pure metal have been unearthed the size of a man. Sometimes the rock will exhibit what is called dendritic ore, where the pure silver assumes the form of the trunk and branches of a tree. In other places, jutting

COBALT STATION. (*p. 64.*)

out from the red-black rock face, can be seen threads of pure silver, fine as a thread of cotton. The filling of the veins consists usually of calcite or dolomite carrying native silver, together with arsenides of cobalt and nickel.

The presence of great quantities of arsenic renders smelting of the ore exceedingly dangerous to health. Until the vital necessity of suitable ventilation became apparent, the lives of many workmen were sacrificed in the early attempts to treat the most vicious grade of ore. Smelting-works have had to be set up in localities far from the haunts of men, so as to minimise the risk of human life from dangerous fumes. The presence of arsenic is most prejudicial to refining, and the utmost care has to be taken to refine such silver. Even a suspicion of this awkward ingredient renders separate treatment necessary.

The product of those veins called high grade has an average value of about 3000 ounces of silver to the ton of 2000 lbs., although in notable cases, such as the Carson vein of the Crown Reserve Mine, a body of this high grade was opened up averaging over 12 inches in width and over 6000 ounces to the ton. This remarkable vein, within a length of 286 feet and an average depth of 165 feet, produced the enormous amount of 10,000,000 ounces of silver. In addition to the high-grade material, the rock on each side of the vein is impregnated with small flakes and veinlets of ore, designated mill ore, which averages from 20 to 30 ounces of silver to the ton in most of the producing mines of the district. Naturally there can be many different combinations of high grade and mill rock. Some mines, however, consist principally of high grade, and in one notable case 90 per cent. of the production has been derived from such material.

Other mines in the district have less high grade and more low grade, although all of them comprise some of the former. This condition arises when the high-grade vein, instead of occurring in a regular form, say 1 to 2 inches in width, to be picked out separately, breaks up into a number of little veinlets, and the whole mass has to be mined at once.

Assuming a case where half the production is high grade and half low grade, the procedure is as follows. When the ore is mined, it is hoisted to the surface, crushed to about 2-inch cubes, and passed over a moving belt. Men on each side of this belt pick off the pieces of high grade, representing in weight only 1 per cent. of the mass. This high grade is sacked, weighed, and numbered; the remaining 99 per cent. is mill ore, containing 20 to 30 ounces per ton, and is dealt with in the cyanide mill. The product from this mill is silver bullion, which is refined and sold either in London or New York.

The richer ore is divided into two classes: the pieces which really are slabs of metallic silver, and the regular high grade. Metallic silver is melted down at the mine itself in graphite crucibles, the impurities are roughly fluxed off, and the metal is made into bars assaying 880 to 850 fine. The high grade is shipped in car-load lots to any one of the Canadian smelters especially designed to treat this ore. The value is determined by sampling, and the smelter pays in cash for the silver contents, or in some cases delivers the bullion equivalent.

Appended will be found a list of the principal silver-mines in the Cobalt district, together with their respective outputs during a series of years.

Fine Ounces.

	1917	1915	1913
Nipissing	3,794,242	4,610,051	4,600,000
Mining Corporation of Canada	4,546,065	4,342,795	..
Coniagas	1,273,853	1,916,616	3,550,237
La Rose	478,639	1,071,694	2,623,000
M'Kinley Darragh	1,013,602	1,061,827	2,250,000
Buffalo	645,915	under million	2,000,000
Kerr Lake	2,302,466	2,109,355	2,109,975
Crown Reserve	309,420	under million	1,833,333
Cobalt Townsite and City of Cobalt	absorbed in Mining Corporation of Canada	absorbed in Mining Corporation of Canada	1,783,554
Cobalt Lake			1,200,000
O'Brien	1,050,149	under million	1,200,000
Seneca Superior	1,064,325	1,996,257	1,150,000
Temiskaming	887,122	1,386,400	735,000

The Nipissing mine produced, from 1904 to December 1915, 41,209,238.02 ounces of silver, valued at $22,158,065.16.

It will be noticed that the tendency of the outputs of the chief mines is to shrink. The reason is because the richest veins were worked first and the less promising are now being attacked. Naturally the labour involved is greater in the latter case, and a greater quantity of material has to be moved. The rockface adjoining the richer veins is worth working, for minute fissures are frequently filled with the precious metal, and the appliances are now so complete that ore can be crushed and dealt with in a much more economical manner than in the early days of the camp.

A remarkable feature of the Cobalt minefield is that veins were traced frequently beneath the many lakes in the vicinity, and the bold step was taken of having the lakes drained. This action was amply justified in several instances, and the exposure of the veins out-cropping from the lake-bed was a welcome reward to the enterprise of the miners.

The relation between the various mines is more friendly than is customary. One mine will at once advise another if one of its veins dips into its property, and will even place the use of its shaft at its neighbour's disposal for the removal of ore. This is quite a contrast to the practice which obtained in the day of Agricola, whose amusing woodcut is reproduced showing hired braves defending the underground alleyways of their respective mine employers.

There remains still a possibility of some extension of the area known to be silver bearing, but mining engineers are not hopeful, notwithstanding that a vast extent of territory lies to the north awaiting the attention of the prospector. The fir forests which stud the region, and the desolate and often perilous journeys which have to be taken in a summer season all too short, present a serious barrier to investigation.

A return of the silver production of the Cobalt Mines now follows, by which it will be seen that the acme of

the output was in the year 1911, and that the falling off is becoming acute.

Silver Production, Cobalt Mines, 1904 *to* 1917.

Year.	Producing Mines.	Ore.	Silver Contents.		Total.
			Concentrates.	Bullion.	
	No.	Ounces.	Ounces.	Ounces.	Ounces.
1904 . .	4	206,875	..	..	206,875
1905 . .	16	2,451,356	..	..	2,451,356
1906 . .	17	5,401,766	..	..	5,401,766
1907 . .	28	10,023,311	..	..	10,023,311
1908 . .	30	18,022,480	1,415,395	..	19,437,875
1909 . .	31	22,436,355	3,461,470	..	25,897,825
1910 . .	41	22,581,714	7,082,834	980,633	30,645,181
1911 . .	34	20,318,626	8,056,189	3,132,976	31,507,791
1912 . .	30	15,395,504	9,768,228	5,080,127	30,243,859
1913 . .	35	13,668,079	8,489,321	7,524,575	29,681,975
1914 . .	32	6,504,753	8,915,958	9,742,130	25,162,841
1915 . .	24	6,758,286	10,001,548	7,986,700	24,746,534
1916 . .	28	4,672,500	7,598,011	7,644,579	19,915,090
1917 . .	28	3,271,353	6,445,243	8,053,318	19,401,893

THE BROKEN HILL BEFORE MINING. (*p. 69.*)

CHAPTER VII

PRODUCTION OF AUSTRALASIA

The Broken Hill—Situation—Home of the Kangaroo—Captain Sturt's travels—Sheep-runs—Discovery of silver—Luck—Expense of living—Money earned easily, spent quickly—A boom—Fires—Choking miners—Development—Enormous dumpings—Balance Sheet, 1915—Total production to end of 1915—Remarkable diversion of energy—Kipling on iron—Future of district—Australasian output.

THE history of silver in Australia is practically that of the Broken Hill Proprietary Company and the adjoining mines. Of these the first named alone yielded metals producing the enormous sum of £158,408,072 up to 21st May 1913. No better selection can be made than this Company for the purpose of illustrating the history and development of an important silver-mining industry. It may be considered as one of the greatest, perhaps the greatest mine in the world—not on account of its output of silver, though that has been extremely large, but because of its vast and varied metallic wealth, the steady advance in its development, the enormous extent of its reserves, the ingenious way in which the resources of science have been adapted to the special difficulties which have arisen from time to time in treating its ores, and the way in which money has been used without stint to provide the very finest plant extant.

The comparative modernity of the enterprise, dating back only to the year 1882, makes the stages which carried the mine from discovery to mature growth easy to trace.

Situated about 26 miles east of the western border of the colony of New South Wales, and distant 282 miles by road from Port Pirie, the nearest seaport, the Broken Hill stood in the midst of an arid tract of almost desert country, sparsely covered with vegetation. Although the

hill formed part of the Barrier Ranges, which extend for about 150 miles with a varying width of 24 to 110 miles, it stood perfectly isolated about 150 feet above the surrounding country. The hill, almost bare of trees and shrubs, was trodden rarely by the foot of man, but was the happy haunt of the kangaroo and wallaby, who found sanctuary in the natural caverns on its summit, or in the recesses formed by the huge rocks scattered along its sides.

The earliest allusion to the Broken Hill occurs in 1844, when Captain Charles Sturt, in his narrative of an expedition into Central Australia, noted his discovery that 'along the spine of the hill was a line of the finest iron ore I ever saw; it laid in blocks of various sizes and of many tons weight, piled one upon the other without a particle of earth either on their faces or between them. On ascending this hill and seating myself on the top of one of them to take bearings, I found that the compass deviated 37 degrees from the north point, nor could I place any dependence on the angles I had taken.' In fact, the whole eminence was one huge loadstone. It is necessary to speak of the Broken Hill in the past tense, for where the hill stood is now a huge hollow. Though Captain Sturt appeared to have suspected the presence of other metals besides iron under the ironstone capping upon which he rested in 1844, he could have had no conception of the enormous wealth of precious metal to which he was so near. Even had he found a rich specimen of silver ore, as an aborigine did in later years, it is very doubtful if anything could have been done to develop the mining resources of the district at that period. The distance from the seaboard, and the uninviting character of the country, would have deterred the most enthusiastic from risking the necessary capital. The district remained for many years a sheep-run, and several other mines in the neighbourhood became in active operation before the possibilites of the forbidding mass of metal called the Broken Hill were even suspected. In 1876 silver-lead ore was first found at Thackaringa, 20 miles north-west of Broken Hill, and so rich in silver did the

lead ore abounding in the district prove, that a rush of prospectors soon set in.

In 1882 the attention of a herdsman named Charles Rasp, doubtless in the course of his daily occupation, was struck with the mineral outcropping the ridge of the Broken Hill, and he carried the result of his investigations to his employer. The two men each pegged a block, and with five others who acted in like manner, formed the seven blocks into a private company, called the Broken Hill Mining Company. Philip Charles, a boundary rider, spotted some chloride in his claim, and galloped back excitedly to his chums, exclaiming: 'I'm in luck at last, see this!' Met with chaff and laughter, he continued, 'Why, I might get £5000 for my shares in a year or two.' Three years later these shares were worth £1,500,000.

Nearly all discoveries of great minefields have arisen from mere accident, but the profitable use of the accident depends upon the discoverer. The prizes from successful mining are certainly vast, but it is well to remember that there are other great prizes in the world which await those who seize opportunities. Many men limp through life lamenting what they describe as their ill-luck, when the truth is that they have neglected to seize opportunities, which have stared them in the face.

If the prizes were great, so were the hardships to be undergone. In the next year or so, water was 6d. a bucket, and was very poor stuff at that. The best quality commanded 1s. a bucket, and bread cost 2s. a 4 lb. loaf; vegetables could not be bought for love or money. Meat was comparatively cheap at 7d. per lb., for the very good reason that the locality was used as a sheep-run. What the other conditions of life were it is not difficult to imagine. The merest shanty sufficed for shelter, and manners and clothing alike were of the roughest quality. The first Government official was the Post Mistress, who received the handsome remuneration of £10 a year.

Better housing accommodation was provided, roads were laid out and metalled, and various industries built

up, which in the course of time created a prosperous community, the foundation of whose success was the fortunate discoveries of rich silver deposits in the Broken Hill district.

The neighbourhood became transformed. High wages attracted miners from all parts, and a population assembled to minister to their wants. Money made quickly is usually spent freely—here, there was no exception to the rule. Clubs for sport were started and flourished, so that, though luxury was still lacking, life became more easy and pleasurable. This change from hardship to relaxation has taken place wherever a flourishing mining industry has arisen, and the change has been associated in many cases with more sombre and sensual features than were to be found in this instance.

An episode occurred in 1888, common to the discovery of most new ore fields. A boom broke out, and people went almost stark mad. The only notion in the head of the public was to create, buy, and sell shares—shares of any shape—shares in untested mining propositions, shares in land, in food supply, in transport, shares in anything, if only shares. Bank clerks threw up their positions and invested in paper certificates, of which the marketable value rose by leaps and bounds. Broken Hill Company shares reached £412, and were expected to reach £1000.

On 23rd May they fell to £252, a loss in value calculated upon the whole stock of the Company of £3,700,000. On eight mines together, the loss amounted to £8,760,000. If any one had dared to suggest that the whole worth of the mines in question would have been £8,000,000 two or three months before, he would have been thought a lunatic. Still, it is to be noted that in that year the Broken Hill alone provided one-thirtieth of the annual output of silver in the world, even though it had been worked barely for five years. The inevitable collapse of the boom brought ruin to many an optimistic speculator, and caused the closing down of several promising mines.

THE BROKEN HILL AFTER MINING.

(*p. 72.*)

The Broken Hill Mine was subjected to two fierce ordeals of fire. The first broke out in Block 11 somewhere between the 100 and 300 feet levels, on the evening of 21st July 1895. Thin smoke whirled upward from the shafts, and the officers who descended found the subterranean ways filled with dense stupefying mist, which drove them back toward the outer air. The huge timbers of the mine, chiefly of Oregon pine full of resin, smouldered and gave out poisonous gases, and threatened to choke the gasping staff in their attempts to fight the flames with water-jets.

Throughout the night gangs of brave men built barricades, labouring without stint to save the engineering works, which were the basis of their livelihood. Immense quantities of water were pumped into the burning galleries, and tons of sand. Explosives were discharged with the intention of blocking the air-channels and thus arresting the combustion, but, like the dragon of mythology, the more it was fed the more its fiery breath scorched and consumed. Fortunately no loss of life occurred, but the ill-success in combating the flames led to the reduction of the mine staff from 2900 to 1260 men, and the fire continued to burn for many years. On muggy days the smell of timbers and ores in combustion hung over the town. The very ironstone often had to be sprayed with water before it could be handled.

On 12th September 1897, Block 12 was found ablaze. Volunteers were called for, and there was no lack, though death from burning and suffocation was risked by all. Three men lost their lives, and a hundred endured agonies of suffering, from which the dead escaped. For more than two months the fumes continued so powerful that men were overcome again and again. The fire burned steadily on in one section of the block, keeping the fire in Block 11 company for several years in succession. There was a suspicion that these fires were of incendiary origin, but actual guilt was never brought home.

The labour involved by what is technically described as ' Development ' in a mine of such a size as this now being discussed is tremendous. When shafts were sunk,

the crest of the hill was found to be the outcrop of a huge lode, varying from 10 to 120 feet, and changing constantly in character at lower depths. It consisted of iron-bearing quartz, felspar, brown iron ore, called gossan, and oxide of manganese, which latter constituent gave often a black colour to the grass. The gossan gave an assay of over 3 ounces of silver to the ton.

As the lode was pursued, an enormous quantity of adjoining material had to be carted away, and dumped some distance off, so that in course of time hillocks began to surround the site of the original hill. This refuse material was by no means worthless, though discarded for the time being. As a matter of fact it proved exceedingly remunerative in after years, when chemists and engineers found methods to extract cheaply the metallic wealth which it contained.

The field is one of the most extensive in existence. The area consists of 2500 square miles, of which only a limited portion has been worked, attention having been concentrated for many years upon the Broken Hill lode, which has been traced for more than three and a half miles.

The metallic deposits are enormous. As long ago as 1905 there was considered anything up to 5,500,000 tons of ore reserves, 11,000,000 tons of sulphides, 6,000,000 tons of zinc-bearing tailings estimated to contain 1,400,000 tons of lead, 55,000,000 ounces or 1800 tons of silver, altogether considered worth a gross value of £126,000,000, or a possible profit of £17,000,000 in the nine or ten years working. A great feature of the operations has been the immense dumpings of ore, considered at the time of extraction too poor and intractable to be worked.

The magnitude and stability of the enterprise are evidenced by the huge figures set out in the half-yearly balance sheets of the Company. The working account for the half-year ending 31st May 1915 totals £881,149, 13s. 1d., of which £103,000 is for silver, £401,000 for bullion and soft lead, £200,000 for other products, and £175,000 profits derived from smelting and

refining the ores of adjacent properties. On the debit side, the expenditure on freight is about £94,000, on fuel £85,000, on horses and drays £107,000, whilst the balance carried to profit-and-loss account, after allowing for wages, salaries, and expenses, is £272,279, 4s. 9d. The profit-and-loss account deals with even greater figures, namely, £1,274,348, 6s. 10d., and a balance is carried forward of no less than £1,062,809, 5s. 3d. Bonuses in cash or shares amount to the enormous total of £12,500,201, 4s. during the thirty years which have elapsed since operations were first commenced by the original company.

The following is the production of the Broken Hill Proprietary Mine since its discovery:

Year.	Quantity of Ounces. (Fine).
1885	35,605
1886	1,016,239
1887	2,103,225
1888	3,924,192
1889	6,003,299
1890	7,727,877
1891	9,947,038
1892	8,065,148
1893	12,505,426
1894	14,054,393
1895	10,392,271
1896	8,135,870
1897	6,864,540
1898	5,565,230
1899	4,720,697
1900	4,956,359
1901	5,693,110
1902	5,352,189
1903	4,882,143
1904	5,089,918
1905	5,602,514
1906	4,615,430
1907	5,481,335
1908	3,880,419
1909	1,301,342
Carry forward	147,915,839

Year.	Quantity of Ounces. (Fine).
Brought forward . .	147,915,839
1910	1,612,053
1911	2,261,471
1912	2,211,363
1913	3,426,938
1914	3,137,280
1915	1,789,380
	162,354,324

It will be observed that during the years 1891-96 the mine was a most important factor in the price of silver. Its output during these six years was about one-fifteenth of the world's supply.

A Company, called the Broken Hill Associated Smelters Limited, having been formed to deal with the lead-silver concentrates from the Broken Hill district, the output of the Broken Hill Proprietary Mine, appears in the total of this Company, which was as follows:

Year.	Quantity of Ounces. (Fine).
1916	4,297,243
1917	5,798,020
1918	6,598,852

An astonishing development has arisen from the mining industry carried on at Broken Hill. The lead and silver contents of the mine have been so reduced that they cease to form the basis of the profits, and the management have concentrated their efforts to utilise with best advantage the valuable deposits of iron, styled respectively the Iron Knob and the Iron Monarch, which lie within their property. The mining is combined with the manufacture of steel under the same management, on such a scale that the needs of Australia can be supplied, and ample supplies shipped abroad.

The enterprise is upon a sound foundation, and the quantity of ore almost inexhaustible. Well may the Company grace its report with the lines of Kipling:

> 'Gold is for the mistress—silver for the maid!
> Copper for the craftsman, cunning at his trade.
> "Good," said the Baron, sitting in his hall,
> "But Iron—Cold Iron—is master of them all!"'

It must not be inferred from the above that silver has ceased to be produced from the Broken Hill district. The veins have merely slanted out of the Broken Hill Proprietary Company's property at a depth of some 1400 feet into that of adjoining mines, and handsome returns will be obtained from these mines in the form of silver for a long while to come.

CHAPTER VIII

ASSAYING

The touchstone—Theophrastus and trial by fire—Alchemists—An Assayer in the eighteenth century—His successors—Mystery of assaying—Sixth in descent—Hairdressing—How to cut assay pieces—Scales—Hair weights—Check pieces—A lead napkin—Cupels—The muffle furnace—The chrysalis—Cooking metal—Calling for Saints—Sampling—Gay Lussac process—Precipitation by salt—The laws of the universe.

HOOVER states in a footnote to his *Translation of Agricola* that we have but little record of anything which could be called 'Assaying' among the Greeks and Romans. The fact, however, that they made constant use of the touchstone is sufficient proof that they were able to test the purity of gold and silver.

Agricola thus explains the principle of determining quality by this method. 'A touchstone must be selected which is thoroughly black and free of sulphur, for the blacker it is and the more devoid of sulphur, the better it generally is; I have written elsewhere of its nature. First the gold is rubbed on the touchstone, whether it contains silver or whether it is obtained from the mines or from the smelting; silver also is rubbed in the same way. Then one of the needles, that we judge by its colour to be of similar composition, is rubbed on the touchstone; if this proves too pale, another needle which has a stronger colour is rubbed on the touchstone; and if this proves too deep in colour, a third which has a little paler colour is used. For this will show us how great a proportion of silver or copper, or silver and copper together, is in the gold, or else how great a proportion of copper is in silver.

'These needles are of four kinds. The first kind are made of gold and silver, the second of gold and copper,

THE MUFFLE FURNACE.

(*p. 78.*)

the third of gold, silver, and copper, and the fourth of silver and copper. The first three kinds of needles are used principally for testing gold, and the fourth for silver; the set usually consisted of twenty-four.'

The description of the touchstone by Theophrastus contains several references to 'trial' by fire. The ancients were adepts at metal working, and were therefore familiar with melting metals on a small scale, with the smelting of silver, lead, copper, and tin ores, and with the parting of silver and lead by cupellation. Consequently it would not require much of an imaginative flight to conclude that there existed some system of tests of ore and metal values by fire. Apart from the statement of Theophrastus, to which attention has been drawn, the first references made to anything which might fill the role of assaying are from the alchemists, particularly Geber (prior to 1300 A.D.), for they describe methods of solution, precipitation, distillation, fusing in crucibles, cupellation, and of the parting of gold and silver by acid, and by sulphur, antimony, or cementation. However, they were not bent on determining quantitative values, which is the fundamental object of the assayer's art, and all their discussion is shrouded in an obscure cloak of gibberish and mysticism. Nevertheless therein lies the foundation of many cardinal assay methods, and even of chemistry itself.

The first explicit records of assaying are the anonymous booklets published in German early in the sixteenth century under the title *Probierbuchlein*, in which the art is disclosed well advanced toward maturity so far as concerns gold and silver, with some notes on lead and copper.

The business of an assayer is of respectable antiquity, for the 'parting assay' was the subject of a decree by King Philippe of Valois in 1343, and was seen in operation by Pepys at the Tower of London in the seventeenth century.

In a volume of chatty *Reminiscences*, the Rev. T. Mozley, M.A., describes a visit paid to a Mr. John Johnson, who was engaged at his business in the latter

part of the eighteenth century. This gentleman was the father of two sons, each of whom became the head of an assaying firm which exists to this day. The elder founded the firm of Messrs. Johnson, Matthey and Co., Ltd., of Hatton Garden, E.C., and the younger carried on the paternal business now styled Messrs. Johnson and Sons, of Cross Street, Finsbury, E.C. In connection with the latter firm is to be found a member of the sixth generation.

The following extract pictures the surroundings of an assayer a hundred years or more ago:

'I know not how my cousins had already become acquainted with the family of a gold assayer, pursuing his quiet occupation in a narrow lane near the Goldsmith's Hall, behind where now stands the Post Office. The alchemist, for such he might have been taken for, did his work in a very small dark room, with what looked like an oven at his right hand, a broad ledge before him, and a window in front. On the window-sill were many bottles of chemicals. He was himself a rather grim, very taciturn, elderly man. His large hands seemed hardly suited for delicate manipulation, and they were stained all over with the corrosive stuffs about him. Opening his oven-door, he disclosed a little furnace, from over which he took out very small earthenware cups, or crucibles as they were called. In what looked like ash, or other debris, there were very minute beads of shining metal. These were the gold or silver from which the alloy had been extracted by an acid or some other substance under fusion.

'The wife of this taciturn gentleman, who must once have been pretty . . . lived healthy and happy to near a hundred. Her eldest son sought employment under mining companies in America, and finally settled in Hatton Garden, where he devoted himself to the then newly discovered metal platinum. I think I remember his receiving three thousand guineas from the Emperor of Russia for a caldron of platinum.'

In order to give the reader an idea of the manner of assaying at the present time, a visit was paid in 1915

AN ASSAYER'S BALANCE.

(*p. 80.*)

to the assay department of the firm founded by the father of Mr. John Johnson. Occasion will be taken to describe elsewhere silver operations carried on by the firm established by his elder son.

If the ordinary business man be told that it is possible to determine how many parts in the thousand of a piece of silver weighing, say, one-tenth of an ounce are pure silver and how many alloy, he is apt to be somewhat astonished. If he be told further that it is possible to take a piece of metal of like size containing a mixture of silver and gold, and to decide by a certain process the number of parts in the thousand comprised respectively of pure silver, pure gold, and of alloy, his surprise will be still greater. Indeed, not only the ordinary business man, but one who for thirty years has been accustomed to see pieces of metal sent out for the purpose of assay and returned within a few hours duly labelled with their respective metallic contents, has never ceased to marvel at the seeming miracle thus performed. When a visit to the assay office was arranged, the writer knew that the mystery which had been so long a perplexity, was in a fair way of being solved. Perhaps the reader will not be unwilling, though at second-hand, to take part in the same fascinating séance.

The four official assayers to the Bank of England and the Royal Mint are considered to rank equally in their professional capacity; but that of Messrs. Johnson and Sons was selected for a visit because a Johnson, sixth in direct descent, is being trained to head the concern, and thus a long unbroken link is maintained with the founder.

It was in the dusk of an inclement wintry day that the modern building, displaying within and without artistic taste unusual for a business house, was made the object of a visit. On the first floor within the partners' dining-hall, relics of John Johnson, the second principal of the firm, were inspected, such as his first year's expenditure, drafted in 1786 by his own hand—the personal touch enhanced by a reference to the cost of hairdressing, no doubt alluding to the wig peculiar to

the period. In his days the staff consisted merely of a couple of apprentices—now it exceeds that number a hundredfold. A metal frame with divisions, technically described as a range, used for separating pieces in the process of assay, which had been in actual use from 1777 to 1855, effectively brought the present into rapport with the past, and helped to conjure up a picture of the old gentleman, long since gathered to his fathers.

The portion of metal received by the assayer usually consists of a small lump chiselled out of the ingot where the exterior is fairly smooth and free from accidental blemish; a fair place for fine gold or fine silver bars is half-way down one angle of the bar. For impure bullion, however, other methods of obtaining the assay quantity need to be employed on account of the varying specific gravities of the constituent metals, and the tendency of the respective particles to group independently during the cooling and setting of the mass after melting. For this reason, in the case of low-grade bullion, a sample is removed in a small ladle from the molten mass in the crucible, or when cold the metal is drilled in one or more holes, and the particles thus obtained form the assayer's sample. The comparative value of the several methods depends entirely on the nature of the alloy associated with the gold and silver. The sampling of ores and minerals will be described later.

The first stage of the assay process is to reduce the lump of metal to a flat sheet easily cut with shears; this is done by flatting with a heavy hammer, followed by rolling if necessary.

The principal room of the assaying office contains a series of scales, the delicacy of which is marvellous. The least delicate of the machines records to one-thousandth part of a grain, whilst, in a sort of sanctum sanctorum, are tabernacled machines reserved for weighing gold, capable of recording to the ten-thousandth part of a grain. These latter instruments rank in accurate working with those used to determine the absolute weight of the National Standards, and are naturally costly; they are manipulated from without, so that their operation

shall not be marred by even a stray breath of air. Tiny bent weights, formed of wire fine as a hair, can be raised from their rest and placed upon the beam, without opening the glass case which enshrines the instrument. The instantaneous effect on the pointer after an infinitesimal filing is taken from a piece of metal that has been previously weighed, shows that the assayer has secured absolutely marvellous accuracy from the machines used to ascertain the weights before and after the test. For the assay proper, two or more snippets are severed from the flattened metal and their weight recorded; at the conclusion of the process an average is deduced from the individual trials. Upwards of a hundred pieces are frequently passed together through some stages of the assay process; with each ten pieces, a check piece is treated at the same time. This check piece is of a quality definitely and absolutely ascertained. If its assay fail to reach its known standard, the fact enables the assayer to correct the other ten results to the extent of the difference. Each piece is wrapped in a tiny leaden napkin, has a number assigned to it, and, by means of a system devised to minimise the risk of confusion, goes by this number until the result is folded into a paper that records the result of the trial. The lead-covered pellets are now placed in a cuplike receptacle called a 'cupel,' from 'cupella,' or little cup. It is a square of prepared bone-ash, not unlike the chalk applied to the tip of a billard cue both in shape and appearance. Rows of these cupels are heated to a suitable temperature in a gas furnace. For gold assays this temperature is round about 1800 degrees Fahr., and may be roughly described as white heat. The leaden pellets are placed in their respective cavities, and the opening of the furnace is closed by a door composed of two pieces of fire-brick, of which the upper is removed whenever it is necessary to watch the progress of the test.

This portion of the operation occupies twenty minutes more or less. The eye can detect the impurities, lead and what not, sinking gradually into, and discolouring the bone-ash until at length a change takes place,

when, as it were, the chrysalis changes into the butterfly. A curious stirring of vaporous iridescence, and a lovely globule of fine bullion glitters in the cupel. The bead is left to cool gradually in the furnace with the gas off, otherwise fragments of the metal are liable to be emitted. Any loss of metal from such a mishap naturally destroys the hope of an accurate result when the fine metal is weighed. An expert operator can tell by the colour and staining of the cupel the character of the alloy which the assay piece contained.

An assay of parting silver, that is to say of metal containing silver and gold, proceeds upon similar lines until the bead is obtained. The bead is rolled into a flat strip which is placed in a vessel containing nitric acid, and cooked, so to speak, over a fire. In order to be able to observe the process with the eye, a strip was dropped into a glass phial. The acid became in violent commotion, and there appeared amid the bubbles dark specks, which, after having been dried in a small furnace with a heat of 900 degrees Fahr., proved visible to the eye as pure gold. The parting of the gold from the silver seemed decidedly uncanny, and provoked a remark that in mediaeval times many a man had been burnt alive for performances far less questionable.

The weight of the bead having been taken before the gold was extracted, all now necessary to determine the amount of fine silver in the original piece of metal is to deduct the weight of the gold residue from the weight of the bead, and the proportion of these two weights to the original piece of metal constitutes the desired result. It may be noted, however, that for certain kinds of silver three other processes of assay are available: the first two, evolved by Gay-Lussac and Volhard respectively, depend on noting the volume of certain solutions required to neutralise or precipitate a certain weight of the bullion; in the third, known as the Indian Mint method, the silver is converted into chloride and then weighed.

The personal attention needful to watch the process throughout, the judgment required as to the temperature, the length of time during which the metal is subjected

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to it, the care demanded lest pieces be confused in the process, and the infinite patience necessary in the several weighings, place the assayer in a position of grave responsibility, in which he may need often all the help he can claim from Saint Nicholas or Saint Dunstan, whichever be the patron saint of his calling.

An assayer's workroom, including as it does furnaces, retorts, and glass utensils of uncommon shape, has that uncanny appearance still, which earned for alchemists of old a far from pleasant reputation.

The description of assaying already given applies mainly to bullion which has been reduced from ore. An important branch of assaying is that which deals with the determination of the proportion of silver contained in the original material mined from the ground. The ore is treated sometimes upon the spot, but is more often conveyed by rail or ship to the Smelting Companies which convert its contents into bullion. Large samples are drawn and sent to a specially prepared sampling floor, generally constructed of steel, where the ore is ground to a fine powder. The mass is thoroughly stirred and mixed until the quality is rendered more uniform. The heap is divided into four parts, of which two diagonal portions are removed and the remainder undergoes further careful mixing. The same process continues until some seven pounds weight of powder remains. From this, three portions are taken at one time, one for the seller, one for the buyer, and one for a referee in case of disagreement between the two former; the packets are sealed in the presence of both parties.

Weighed quantities of the sample, now reduced to minute particles, are next subjected to the action of fire, which, with the aid of certain fluxes, bring the silver into such a condition that it can be described as bullion, and recovered by refining processes. The further test is made by either the dry or Gay-Lussac methods. A few details as to the latter, by means of which fine silver assays are often determined, may prove of interest.

A portion of the bullion, carefully weighed, is placed in a bottle with measured quantities of nitric acid, in

which the silver becomes absorbed, forming a colourless liquid called nitrate of silver. To this an amount of common salt solution, also carefully measured, is added. The liquid instantly becomes milky in appearance, and the silver coagulates with the new ingredient and falls gradually to the bottom. The growth of the sediment is accelerated by violent shaking, an operation once performed by hand, but now with the aid of an electric appliance.

By introducing a further measured amount of salt after the shaking has been effected, it is possible to detect whether all the silver has been carried to the bottom of the bottle, for if not, a certain amount of turbidity is observable at the top of the liquid contents.

The proportion of silver within the bottle is determined by the proportion of salt required to produce absolute precipitation of the silver. To a minute extent the calculations are affected by the condition of the atmosphere. For this reason silver material of known fineness is treated at the same time, and the result of the test adjusted to correspond. Thus an exactly opposite method of ascertaining the silver contents is adopted to that of cupellation, where the extracted silver is weighed.

The delicacy of an assayer's handiwork demands admiration, but far more impressive to the onlooker is the revelation of the laws governing the Universe, upon which his art depends. It is difficult to conceive an assayer entering the ranks of anarchy or of atheism, knowing, as he does, how vital to his success is an absolute adhesion to law, and that the existence of law implies that of a Lawgiver.

REFINERY

(a) Grate ; (b) Brass block ; (c) Block of wood ; (d) Cakes of silver ; (e) Hammer ; (f) Block of wood channelled in the middle ; (g) Bowl full of holes ; (h) Block of wood fastened to an iron implement ; (i) Fir-wood ; (k) Iron bar ; (l) Implement with a hollow end ; (m) Implement, the extremity of which is bent upwards ; (n) Implement in the shape of tongs.

Reproduced from 'AGRICOLA,' Published 1556 *A.D.*

(*p. 87.*)

CHAPTER IX

REFINING

St. Nicholas—A mysterious art—Advance of refining—Electrum—Leaden figure in 3800 B.C.—Silver necklace, 2400 B.C.—Chinese classics—Biblical experts on refining—Everlasting fire and Hell—Pliny an authority—Roman mining in Britain—Ancient pictures—Early German metallurgy—Diversity of methods—Agricola and silver refining—The Patio process—London refiners—The Royal Mint Refinery—A bankers' speciality—Increased gold output—A refining hall—Fumes and fans—Tell-tale marks—Aptitude of French workmen—Electrolytic refining.

THE Rev. T. Mozley, M.A., in his book of *Reminiscences*, refers to the patron saint of metallurgists in the following passage:

'Only the other day my recollection of the assayer's crucibles and the pretty little bright bead in them suddenly occurred to me as the solution of the mediaeval legend. I think it was at the consecration of Cholderton Church that I was rather startled to see in the east window what I imagined to be a baptism by immersion, represented by three nude figures in a small bath. It was explained to me that St. Nicholas, the patron saint of the church, on visiting the poor in a famine, and smelling cookery, went into a house, and found that three mothers, who could no longer feed their children, had made up their minds to eat them, only saving the maternal instinct by each eating her neighbour's child, not her own. The children had been cut to pieces and were boiling. The saint reunited the scattered parts, and restored the babes whole and well to the mothers. Now St. Nicholas has ever been the saint of metallurgists, smiths, and jewellers, and I have come to the conclusion that the legendary caldron is the crucible, and the resuscitated children the precious metal after the alloy or other impurity had been, in a manner, boiled out of it.'

The separation of the various metals combined in ore embraces so many elements of mystery that in early days the uninstructed thought that the assistance of supernatural powers needed to be invoked by those who practised the art. The flames, smoke, and pungent fumes which accompanied the operations, together with the weird appearance of the appliances used, increased the awe with which the common people regarded the science. Chemistry is now so well known, that processes, once absolutely bewildering and mysterious, are known to be the simple outcome of natural laws. The world owes a great debt to the persevering efforts of scientific men in ancient and mediaeval times, who, in spite of obloquy and persecution, laid the foundation upon which the enormous modern employment of metals in industry has been rendered possible.

The following are the approximate dates when fresh discoveries were made in the treatment of silver-bearing ores.

This table, as well as the interesting classic references that follow, are taken from the footnotes to *The Translation of Agricola* by H. C. Hoover.

Silver reduced from ores by smelting	2000 B.C.
Silver parted from lead by cupellation	,,
Silver parted from gold by cementation with salt	Christian Era.
Gold parted from silver by nitric acid	1400 A.D.
Gold parted from silver with antimony sulphide	1500 A.D.
Silver parted from iron with antimony sulphide	,,
First text-book on assaying	,,
Silver recovered from ores by amalgamation	,,
Separation of silver from copper by liquation	1540 A.D.
Separation by cementation with saltpetre	1556 A.D.
Separation by sulphur and iron (Schluter)	1738 A.D.
Separation by sulphuric acid (D'Arcet)	1802 A.D.
Separation by chloride gas (Thompson)	1833 A.D.
Separation electrolytically, latter part of nineteenth century.	

It has been argued from the common use by the ancients of electrum—a gold-silver alloy—that they did not know how to part the two metals, or they would not

have wasted gold in such a manner. The fact, however, that electrum always consisted of the precious metals in a similar proportion, namely, 20 per cent. gold and 80 per cent. silver, that it was said to be made deliberately (Pliny, xxxiii. 23) and held of value for its supposed superior brilliancy to silver, and again that goblets formed of it were believed to detect poison, suggest that there were special reasons for using metal of this particular alloy.

With one possible exception, lead does not appear as a distinct metal until long after silver, and yet the metallurgy of the two metals is mixed so inextricably that neither can be considered as existing wholly by itself. Silver could not have been found in sufficient quantity to have supplied the amounts known to have been possessed by the ancients; we must, therefore, assume that they had found how to reduce it by (1) intricate chemical processes, (2) amalgamation, (3) reduction with copper, or (4) reduction with lead.

A leaden figure is exhibited in the British Museum among other articles recovered from the temple of Osiris at Abydos, and is considered to be of the Archaic period —prior to 3800 B.C. The earliest known Egyptian silver article is a necklace of beads, supposed to be of the XII. Dynasty (2400 B.C.), which is described in the 17th Memoir, Egyptian Exploration Fund (London, 1898, p. 22). With the exception of the above mentioned lead specimen, silver articles antedate positive evidence of lead by nearly a millennium. If, therefore, we assume lead to be a necessary factor in silver production, we must conclude that the valuable properties of silver were known long prior to any practical use of lead, with the exception of the above solitary instance. Of course, if we are to conclude that early silver was derived from ore containing these two metals, we must assume that the ancients had a knowledge of cupellation. Lead is mentioned among the spoil captured by Thotmes III. in 1500 B.C. Leaden objects have frequently been found in Egyptian tombs dating back to Rameses III. (1200 B.C.). A statement is made by Pulsifer (*Notes for a History of*

Lead, New York, 1888, p. 146) that Egyptian pottery was glazed with lead. It may be noted, incidentally, that lead is not included in the metals of the 'Tribute of Yu' in the Shoo King (the Chinese Classics, 2500 B.C.?), although silver is so included.

In ancient times rich ores used to be submitted to the action of fire alone, and the precious contents were extracted with the aid of fluxes, after the base residue had been dissipated in the air or skimmed off by the refiner. Malachi, the prophet, refers to this process when he sounds the Messianic challenge: 'But who may abide the day of His coming? And who shall stand when He appeareth? For He is like a refiner's fire, and like fullers' sope. And He shall sit as a refiner and purifier of silver.' A beautiful simile! Not in wrath or unkindness, but, like the ancient craftsman, He waits in patience until His own face is mirrored clearly in the molten metal.

The everlasting fire is commonly associated with the idea of Hell, but that thought does not seem to have been in the mind of the prophet Isaiah (chap. xxxiii. 14), but rather that of the refining properties of fire, which purifies precious metal and destroys the dross. 'Who among us shall dwell with the devouring fire? Who among us shall dwell with everlasting burnings? He that walketh righteously, and speaketh uprightly; he that despiseth the gain of oppressions, that shaketh his hands from holding of bribes, that stoppeth his ears from hearing of blood, and shutteth his eyes from seeing evil; he shall dwell on high: his place of defence shall be the munitions of rocks: bread shall be given him; his water shall be sure.' It is the soul of base material which should dread the fire.

Numerous other references occur in the Scriptures (Psalms xii. 6, Proverbs xvii. 3, xxv. 4, etc.); one of the most pointed, from a metallurgical point of view, is that of Jeremiah (600 B.C.), who says (vi. 29-30): 'The bellows are burned, the lead is consumed of the fire; the founder melteth in vain: for the wicked are not plucked away. Reprobate silver shall men call them, because the Lord hath rejected them.' From the number of his metaphors

in similar terms, we may reasonably conclude that Jeremiah was of considerable metallurgical experience; this corresponds with the critical tenor of his mind. All these biblical references point to a knowledge of separating silver and lead.

Pliny, in the first century A.D., speaking of silver (xxxiii. 31), says: 'After this we speak of silver, the next folly. Silver is only found in shafts, there being no indications like shining particles as in the case of gold. This earth is sometimes red, sometimes of an ashy colour. It is impossible to melt it except with lead ore (*vena plumbi*), called galena, which is generally found next to silver in veins. And this the same agency of fire separates part into lead, which floats on the silver like oil on water.'

The Romans were most active lead-silver miners, not only in Spain, but also in Britain. There are scores of lead 'pigs' of the Roman era in various museums, many marked 'ex argent.' Bruce (*The Roman Wall*, London, 1852, p. 432) describes Roman lead furnaces in Cumberland where the draught was secured by driving a tapering tunnel into the hills. The Roman lead slag was rich in metal, and its refining was an important industry in England during the early eighteenth century.

The ancient Egyptians have bequeathed to later generations records of their daily life and occupations—chiefly on the walls of their tombs. Here are portrayed amongst other details, engraved or depicted in colours, appliances common to the metal worker of all ages. Paintings have been found portraying small furnaces, the earliest owing their power to a simple blow-pipe, the later, dating about 1500 B.C., to bellows. Remains have been laid bare at Mount Sinai, proving the crucible to have been used for melting at a date previous to 2000 B.C. The Hebrew prophets and early Greek writers, during the period ninth to seventh centuries B.C., refer frequently to bellows.

Dry methods of working the rough ore, mostly with hand mortars, continued from the earliest times until the early part of the sixteenth century. Beckmann

(*History of Inventions*, ii. p. 335) says: 'In the year 1519 the process of sifting and wet-stamping was established at Joachimsthal by Paul Grommestetter, a native of Schwarz, named on that account the Schwarzer, whom Melzer praises as an ingenious and active washer; and we are told that he before introduced the same improvements at Schneeberg. Soon after, that is in 1521, a large stamping plant was erected at Joachimsthal, and the process of washing began. A considerable saving was thus made, as a great many metallic particles were before left in the washsand, which was either thrown away or used as mortar for building. In the year 1525, Hans Portner employed at Schlackenwalde the wet method of stamping, whereas before that period the ore there was ground. In the Hartz this invention was introduced at Wildenmann by Peter Philip, who was assay-master there soon after operations at the Upper Hartz were resumed by Duke Henry the younger, about the year 1524. This we learn from the papers of Herdan Hacke or Haecke, who was preacher at Wildenmann in 1572.'

The methods by which silver is now extracted from its ores are several and distinct. The following details are taken from *Elements of Mineralogy*, by Frank Rutley, F.G.S.:

'(1) Amalgamation without heat. In this case the fine divided ore is mixed in heaps with salt, sulphate of copper and mercury, and exposed to the air for some weeks, during which it is continually turned. The result is an amalgamation of silver and chloride of mercury. This is called the patio process, and originated in Mexico. It is very useful where fuel cannot be obtained, but is very wasteful of mercury.

'(2) Ore is sometimes roasted with salt in furnaces, and after treatment with metallic iron is collected as before by the use of mercury. This leads to a saving of mercury, but necessitates a large number of appliances.

'(3) Extraction can be made without mercury when silver exists as a sulphide. Chloride of silver, obtained by calcination with salt, is separated by dissolution in

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boiling brine. The dissolved chloride is run into tubs containing plates of copper. As a result of the new chemical combination which ensues, the silver is deposited in a spongy state. This, known as Augustin's process, was the first used as a substitute for amalgamation.'

Another method, called after Ziervogel, consists in roasting the sulphides of silver, and resolving the resultant sulphate in boiling water containing a little sulphuric acid, from which the silver is recovered in the same way as by Augustin's process.

'(4) Smelting process with lead. When silver is combined with lead in ores, the precious metal can be extracted almost without any loss. When silver-lead is melted and cooled, the first crystals which separate are not so rich in silver as the fluid metal that remains, so that by a process of exhaustion the silver may be so concentrated as to form 2 per cent. of the silver-lead material. When this stage is reached, the compound is melted in a bed of bone ash, and under an oxidising blast the lead becomes oxidised, flows over, and leaves a cake of fine silver behind.'

Agricola, who wrote about 1550 A.D., describes, evidently from personal observations, the process of refining silver in the sixteenth century A.D. in the following words:

'The master, because he needs for the operation of refining silver a fierce fire, and requires on that account a vigorous blast, places the bellows very much inclined, in order that, when the silver has melted, it may blow into the centre of the test blast. When the silver bubbles, he presses the nozzle down by means of a small block of wood, moistened with water and fastened to an iron rod, the outer end of which bends upward. The silver melts when it has been heated in the test for about an hour; when it is melted, he removes the live coals from the test and places over it two billets of fir-wood, a foot and three palms long, a palm two digits wide at the lower. He joins them together at the lower edges, and into the billets he again throws the coals, for a fierce fire is always necessary in refining silver. It is refined

in two or three hours, according to whether it was pure or impure, and if it is impure it is made purer by putting granulated copper or lead into the test at the same time. In order that the refiner may sustain the great heat from the fire when the silver is being refined, he lets down an iron door, which is three feet long and a foot and three palms high; this door is held on both sides in iron plates, and when the operation is concluded, he raises it again with an iron shovel, so that its edge holds against the iron hook in the arch, and thus the door is held open. When the silver is nearly refined, which may be judged by the space of time, he dips into it an iron bar, three and a half feet long and a digit thick, having a round steel point. The small drops of silver that adhere to the bar he places on the brass block and flattens with a hammer, and from their colour he decides whether the silver is sufficiently refined or not. If it is thoroughly purified it is very white, and in a bes there is only a drachma of impurities, or 984·4 fine.

'The refiner governs the fire and stirs the molten silver with an iron implement, nine feet long, a digit thick, and at the end first curved towards the right, then curved back in order to form a circle, the interior of which is bent directly upward. Another iron implement has the shape of tongs, with which, by compressing it with his hands, he seizes the coals and puts them on or takes them off; this is two feet long, one and a half digits wide, and the third of a digit thick.

'When the silver is seen to be thoroughly refined, the artificer removes the coals from the test with a shovel. Soon afterwards he draws water in a copper ladle, which has a wooden handle four feet long; it has a small hole at a point half-way between the middle of the bowl and the edge, through which a hemp seed just passes. He fills this ladle three times with water, and three times it all flows out through a hole on the top of the silver, and slowly quenches it; if he suddenly poured much water on it, it would burst asunder and injure those standing near. The artificer has a pointed iron bar three feet long, which has a wooden handle as many feet long, and

he puts the end of this bar into the test in order to stir it. He also stirs it with a hooked iron bar, of which the hook is two digits wide and a palm deep, and the iron part of its handle is three feet long and the wooden part the same. Then he removes the test from the hearth with a shovel or fork, and turns it over, and by this means the silver falls to the ground in the shape of a half a sphere; then lifting the cake with a shovel he throws it into a tub of water, where it gives out a great sound. Or else, having lifted the cake of silver with a fork, he lays it upon the iron implement similar to tongs, which are placed across a tub full of water; afterwards, when cooled, he takes it from the tub again and lays it on a hard block, and beats it with a hammer, in order to break off any of the powder from the test which adheres to it. The cake is then placed on the implement similar to tongs, laid over the tub full of water, and cleaned with a bundle of brass wire dipped into the water; this operation of beating and cleansing is repeated until it is all clean. Afterwards he places it on an iron grate or tripod; the tripod is a palm and two digits high, one and a half digits wide, and its span is two palms wide. Then he puts burning charcoal under the tripod or grate, in order to again dry the silver that was moistened by the water. Finally, the Royal Inspector in the employment of the King or Prince, or the owner, lays the silver on a block of wood, and with an engraver's chisel he cuts out two small pieces, one from the under and the other from the upper side. These are tested by fire to ascertain whether the silver is thoroughly refined or not, and at what price it should be sold to the merchants. Finally he impresses upon it the seal of the King or the Prince or the owner, and, near the same, the amount of the weight.'

The following description of the ancient 'patio' process of extracting silver from Mexican and other ores is given in Thorpe's *Dictionary of Applied Chemistry*:

'The patio process was invented in Mexico in 1557, and was still in use there in 1908, but is stated to have been abandoned subsequently in favour of the cyanide process. The ore was coarsely crushed by stamps or

otherwise, and then ground with water in arrastras or circular stone floors, round which were dragged stones attached to horizontal arms rotating round a central axis. The finely ground ore was then transferred to a well-paved " patio " or amalgamation courtyard, where it was mixed with mercury, common salt, and " magistral "—a mixture of copper and iron sulphates produced by roasting copper pyrites. The mixing was usually effected by the trampling of mules. The ore-heap, or " torta," was kept wet, but an excess of water was avoided. . . . The period of amalgamation in the "torta" usually lasted from two to four weeks. The mixture was then stirred with water in tanks, and the amalgam, settling to the bottom, was collected, strained through filter-bags to separate the excess of mercury, and retorted. Many ores yielded about 75 per cent. of their silver under this treatment.'

Dr. J. H. Fenn, who resided many years in Mexico, states that the process is still used on a small scale frequently in out-of-the-way places in the vicinity of streams, chiefly for treating stolen ores of high grade. The composition affects to such an extent the feet of the mules employed to trample upon it, that it is not uncommon for them to rot away.

Two great refineries, namely, those of Messrs. Johnson, Matthey and Company, and N. M. Rothschild and Sons, deal practically with the whole of the gold and silver bullion which comes into the London market. A short description of one of these establishments will be apposite.

The Royal Mint Refinery is situated in the vicinity of the Tower of London, where the Mint was formerly installed, and almost alongside the present Royal Mint. The present building is reared upon a site occupied originally by a refinery carried on under the Crown, and to this fact the present works owe their name.

Since the year 1852 the enterprise has been in private hands, and its fortunes linked with the firm of Messrs. N. M. Rothschild and Sons. The refining of the precious

metals frequently has been an appanage to the business of a banking house, and naturally so, because the handling of such an enterprise as refining demands the oversight of principals accustomed to deal with commodities of great value, and the provision of suitable plant involves the outlay of very large sums of capital, which is so locked up that a continuity of business must be secured, otherwise great wastage of money would ensue. Besides, the important foreign relations of a great bank conduce to attract consignments of bullion for separation and realisation. Hence the upkeep of such an establishment as a refinery, quite apart from its commercial character, is a source of legitimate pride to its owners.

The Royal Mint Refinery has undoubtedly handled more gold than any similar institution in the world, for the output of gold in British territory has become enormous within the last few decades, and the bulk of it is refined in this country. There was a time when the same statement might have been made with regard to silver, but the vast increase in the production of silver in the United States of America and the Dominion of Canada has made the erection of local refineries desirable, and for the sake of convenience the outputs of many different mines are refined in establishments situated in central positions. Nevertheless, facilities exist at the Royal Mint Refinery sufficient for the treatment of large amounts of silver, and they are often exercised at full pressure.

The exterior of the Refinery is lofty and massive, and the visitor, as he passes through a wicket-gate in the huge doors, receives a first impression of security and space. He crosses the ample yard and becomes conscious of a somewhat sickly, pungent smell, regarding which he is informed, casually, 'Oh! that is only SO_2.' The first room, about forty feet square, is used for weighing; six large balances within glass cases range the walls, a counter occupies the centre, and stacks of silver bars, fine and otherwise, are on the floor. Weighing operations are so frequent, and lead to such expertness that it is found possible to ascertain the weight of bars, without

previous knowledge of their weight, within an incredibly short time.

The actual refining takes place in a fine central hall, with annexes where minor details are dealt with. Five sets of apparatus stand side by side, each composed of a series of three tanks, two covered and on a high platform, and one uncovered on a lower level. The liquid, with precious metals held in solution, flows down to the lower tank, which measures about 12 feet by 6 feet and is about 3 feet deep. From the open tanks steam rises in clouds, for the contents are heated to 100 degrees Centigrade, and the tanks are continually stirred with long poles to assist the action of the acid. The sulphate of copper in the solution gives a beautiful blue tint to the contents.

The coarse silver bars are dropped through the boiler-like cover of the highest tank, from within which violently whirling snowy vapour charged with acid is drawn, with a sullen roar, through pipes to the basement by the action of a fan set in motion by an electric motor. Here the fumes are forced through intricacies of pipes until the vapour is cooled, and the major part of the acid, which otherwise would have been lost in the atmosphere, is recovered.

Bars, which have been exposed to the action of the acid for a part of the four hours necessary to dissolve them, are still found, when drawn out, to retain their distinctive shape, though of course much reduced in volume. The fact that the acid does its work evenly over the metal once proved the undoing of a dealer, who had purchased a stolen silver bar. When his premises were overhauled, the partially dissolved ingot was discovered in a vessel containing acid. The marks, imprinted deeply upon the original bar, still retained their tell-tale impression, for the acid had done its work impartially upon the surface.

When the silver has all been precipitated to the bottom of the lowest tank, the liquid is run off and the wet silver grains are placed in a hydraulic press and squeezed nearly dry. The bricks thus formed are placed in a furnace

HYDRAULIC CONCENTRATION. (*p. 98.*)

with an amount of pure copper sufficient to render the metal of the desired quality. Finally the molten metal is run into a mould, whence, after cooling, emerges an ingot ready for delivery to the silver market.

Around the central apparatus lies precious material in various stages of purity. The exposure of heaps of fine gold, in appearance like wet clayey sand, demonstrates the need for perfect confidence between employer and employed. Some of these men, by the way, are of French extraction, coming from Normandy, and they have a natural aptitude for the work, passed on in their families from generation to generation. It is interesting to note that in the largest French refinery many of the workmen employed come from the same district in Normandy.

The courtesy of the manager, his anxiety to explain the process, and his perfect mastery of the details, showed that his interesting charge was by no means regarded in the light of a mere duty.

At the present time only one firm in England, Messrs. Johnson, Matthey and Company, possesses an electrolytic plant for refining silver. The apparatus is housed on the first floor in a large, well-lighted room. When the door is unlocked a singular impression of stillness and repose, like that of a tomb, comes over the visitor. Its effect is heightened by rows of tanks, not unlike sarcophagi in size and shape. Amid these evidences of man's mastery over the mysterious and slow-moving forces of Nature, conversation seems most natural in hushed tones. The spectacle is the more impressive as the visitor realises that, amid the constant silence, an electric current never ceases to rid the coarse metal under treatment from impurities until silver residue remains of almost inconceivable fineness. The completeness of the electric installation is remarkable. Special dynamos, constructed at high cost, erected in an apartment devoted to their use alone, supply the current through a heavy cable, and show that no thought or expense has been spared in order to produce results as accurate and pure as mechanical ingenuity and scientific skill can make them.

CHAPTER X

SILVER MANUFACTURES

Melting—Granulation—Rolling—Wire drawing—Turning—Stamping—Hammering—Casting—Frosting — Engraving — Chasing — Beaten work—Filigree—Indian varieties—Peasant jewellery—Piqué—Inlay — Damascening — Onlay — Japanese sword furniture—Mediaeval church doors—Mexican church interiors—Votive offerings—Sheffield plate — Modern plating — Jewelling — Niello — Gilding — Wire for embroidery.

WHATEVER be the process by which the contents of ore is concentrated, silver makes early acquaintance with fire, before or after it reaches the hands of the refiner. When reduced to what is called 'bullion,' the metal has to be remelted in London, unless it originates from a quarter where melting is certain to have been performed beyond reproach. It is of the utmost importance for purposes of assay that the quality should be evenly distributed throughout each bar.

A visit to the melting-house and rolling-mills of Messrs. Johnson, Matthey and Company will now be described.

The melting-house is a lofty structure, of ample space, and furnished with free ventilation. Along one wall is ranged a series of twelve furnaces, connected with one flue. The furnaces are kept going continuously throughout the day with doors closed down. The openings are on the slant, and pulleys to lift the heavy weights run overhead.

A crucible of plumbago and clay is inserted in the furnace, the silver placed in it, and the furnace door closed. In twenty minutes or half an hour, according to the character of the metal, the mass is seen to be in a molten condition, and is thoroughly stirred. In the

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case of low-grade metal, a small quantity for assaying is taken out in a dipper after the fluid metal has been mixed. (In other cases a piece for assay is struck off by a chisel after the bar has cooled.) The crucible is raised by a pulley, and the contents poured into an iron mould, left to cool until it becomes of a dull red colour, and then dropped into a water-tank to hasten the cooling, which otherwise would take some hours. Before its cold bath the ingot is stamped with distinctive marks. Finally the bar is weighed, and an account rendered for any fragments of metal which may have adhered to the crucible.

A melting-house usually contains a machine driven by engine power for cutting a bar into pieces, an operation which it performs with the ease of a knife dividing a pat of butter. There is also a shallow well with a pan at the bottom, into which molten silver is poured in a tiny stream. The metal, as it falls through the water, solidifies into irregular glittering blobs, called granulated silver. Jewellers who desire to manufacture in small quantities prefer the metal in this form. Copper is added to refined silver when ingots of any particular fineness are desired.

Manufacturers of jewellery or of plate obtain silver prepared for their use, in the shape of sheets or wire, from firms who make a speciality of such work. Owing to the great value of the materials in the hands of the workmen, the great room containing them is protected from the public by a succession of locked doors. When the innermost is opened, a veritable hive of industry is revealed, where the clanging of metal, and the whirring of machinery, driven by a 100 horse-power engine, combine to render the voice difficult to be heard.

The metal is first melted into small ingots styled skillets. This is effected by placing pieces of silver into small crucibles within gas furnaces. When liquid, the contents of the crucibles are poured into a mould formed of two pieces clamped together, held vertically so that the glowing metal flows into the narrow end.

When the skillet is set, the clamps of the mould are knocked apart, and the released ingot is plunged into water to cool it the quicker.

The visitor now turns to a pair of steel rollers—about 18 inches in diameter—between which one workman passes each skillet in succession to another facing him. The rolling continues until the metal is reduced gradually in thickness, and, as a consequence, expands in length and width. The continual pressure of rolling hardens the texture of the metal, and the silver sheet has to be placed occasionally within an adjoining gas furnace, or upon a fiery bed of charcoal embers, so as to be rendered ductile. This process is called Annealing.

By means of these rollers, sheets can be turned out of whatever gauge desired. Great care is necessary, lest too much force be exercised for the sake of speed, and the machine be thrown out of gear. It is also of great importance that the thickness of the sheet should be uniform throughout. A certain fascination holds the onlooker as he watches the silver—so hard to the touch—become almost plastic under the steady pressure of the rollers.

In the same building silver is fashioned into round rods of any desired diameter, by drawing strips of metal through twin rollers carrying ten channels of varying size opposed to each other. The metal is drawn successively through these until the required diameter is obtained. In a similar way the end of a slim rod is passed through a smaller machine, the rollers of which possess ten finer channels. Through these, wire of differing diameters is drawn and wound upon a revolving drum, which is also the medium of the motive power.

A special wire, possessing a core of solder, is made for manufacture into chain bags. The melting-points of solder and silver being different, the jeweller is able to close the links by the application of heat sufficient to melt the solder but not the silver, and thus the workmanship of the bag is unaffected by the process of joining the links.

A, B, C—Three furnaces. At the first stands the smelter, who with a ladle pours the alloy out of the forehearth into the moulds. D—Forehearth. E—Ladle. F—Moulds. G—Round wooden rammer. H—Tapping-bar. At the second furnace stands the smelter, who opens the tap-hole with his tapping-bar. The assistant, standing on steps placed against the third furnace which has been broken open, chips off the accretions. I—Steps. K—Spatula. L—The other hooked bar. M—Mine captain carrying a cake, in which he has stuck the pick, to the scales to be weighed. N—Another mine captain opens a chest in which his things are kept.

MELTING HOUSE.

Reproduced from 'AGRICOLA,' Published 1556 A.D. (*p. 102.*)

The appliances of the rolling-mills—each of them driven by mechanical power—enable the workmen to turn out silver of any desired width, thickness, or length with perfect ease and unfailing accuracy, and with a rapidity that astonishes the beholder.

By the courtesy of a firm of manufacturing silversmiths, an opportunity was afforded of watching the manufacture of silver into plate. The plain old-fashioned exterior of the premises gave little promise of the valuable and varied business carried on within. The entrance floor, as became a wholesale house, had no profuse display of silver ware, though an adjoining room harboured some of the many beautiful objects manufactured on the premises. One noticeable gem was a replica, about four inches high, of the far-famed Warwick vase. Some cabinets, containing a collection of old plate used as patterns, occupied the counting-house walls, for, though new designs are largely used, reproductions of many beautiful antique types, either of home or foreign origin, form a feature of the business.

A network of narrow passage-ways led to the work-rooms allotted to the different tasks. The concentration of the workmen at their several benches, and the lively interest shown in their occupation, convinced the on-looker that their occupation left scope for considerable skill in craftsmanship. The firm are not in favour of binding apprentices, but many men were pointed out of over thirty years' service, who had sons working at a bench near by. A pleasant tie between master and men!

Four different methods are used in turning silver from the rough into an article of utility and beauty. They may be described as Turning, Stamping, Hammering, and Casting. Vessels of simple shape, such as bowls, are turned upon a lathe, the quickest and most mechanical process of all, whilst teapots and similar articles are stamped out of flat metal. Copper models of each design are kept in a store-room, so that an order can be duplicated from the original pattern, though many years may have elapsed. Each side of the body of a sugar-bowl is

formed from the same mould, but when there is a left and right, as in the case of a teapot, each side requires a separate mould. A mould is formed of iron, or of steel should a very clear-cut impression be desired. The mould is placed beneath a pulley, by means of which a heavy weight, serrated on the underside, travels up and down within steel guiding stays. A little sand is placed within the mould, afterwards filled with molten lead. The weight, poised a dozen feet above the floor, is let fall with a resounding thud, and upraised with the lead, now roughly shaped, attached to its serrated base.

A copper model of that part of the article which is desired to be struck is now inserted in the mould. By repeated falls from above, the lump of lead is brought gradually into a corresponding form, and, when this has been attained, a flat piece of silver is inserted instead of the copper model. By means of dexterous and modulated strokes, dealt by the leaden mass, the silver is made to accurately fit the mould.

It was remarked by the workman that silver is preferable for such a purpose to either copper or gold, the latter metal being inclined to be 'stringy'—a contrast to the equality and smoothness of texture to be found in silver. In order to preserve the ductility, the metal has to be annealed whenever it becomes too hard under pressure. For this purpose blowpipes are always at hand wherever it is necessary. The better class of oval articles, made in two halves, have an oblong or circular piece inserted in the base so as to avoid a straight join across the bottom.

Great dexterity is employed in the use of the hammer. Bowls, and also ovoid objects, can be hammered out of a flat circular piece of metal. So accurate and exact can a workman become, that, if his work be cut in two, the thickness will not be found to vary appreciably throughout. It is entrancing to watch a grave, spectacled artisan, an evident master of his trade, take a strip of metal like a piece of square pencil, heat it white-hot, and fashion it upon an anvil for a few moments until, with no more assistance than a hammer

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and the judgment acquired by thirty years of practice, the silver takes the shape of a spoon, with the part destined to form the bowl flat, not concave. A little annealing, and a few taps upon a rounded die, and the bowl is formed. A few more taps upon the hinder part, placed against a notch upon the anvil, and the distinctive fold is added which is usually to be seen on the back of the handle. Thus, in a few minutes a spoon is hammered out which needs very little filing, before it is fit to enter the hands of the polisher.

Ornamentation in relief is obtained by chasing, but bosses, such as heads or flowers for instance, are usually cast and soldered into place. Solder, by the way, is composed of silver and brass in the proportion of either 2 to 1, or 1 to 2.

Many beautiful effects are obtained by means of piercing, especially such articles as dessert and sweet trays. This work is done by girls, and needs considerable skill, for the design is often exceedingly intricate. A hole has to be pierced whenever the saw has to be inserted, so that in the case of a basket pattern the number of holes required is extremely large.

As a rule, handles and feet are cast. The operation is performed in a frame of loam, in which the pattern is pressed, so that one half is embedded, and the other remains above the surface. Another frame, with sides and no top, is hinged above this, and filled with loam to the level of the sides. After the loam has been baked hard, the pattern is withdrawn and the two pieces reunited after a channel has been made from the exterior to the mould. Through this molten silver is poured, and, when the metal has cooled, the mould is destroyed and the castings taken out to be filed.

Another workshop is devoted to the putting together and soldering of the several portions of each article. This adjustment demands the utmost patience, in order that the result shall be perfectly well balanced before the solder is applied. The completed shapes pass into other hands, to be filed, brushed, and pumiced until finally beautified with powder and cloth.

'Frosted silver' is produced by heating the article until it becomes a dull red; the air then combines with the copper alloy and forms oxide of copper. By the application of hot diluted sulphuric acid to the part desired, the copper oxide is removed, and the beautiful effect called 'frosted silver' is imparted to the surface. The coating of absolutely fine silver thus left is of almost inconceivable thinness, less than the hundredth part of the diameter of a hair.

The adaptable character of silver, and the fine finish to which it lends itself under a craftsman's hands, enable it to be worked to advantage in a remarkable number of ways. Silver can be cast, chased, pierced, formed into wire, engraved, hammered, made into filigree work, used as an onlay (or damascened) or as an inlay, as in piqué, applied upon wood or composition in the form of thin sheets, or upon metal by plating. The beauty of the metal can be enhanced by the addition of enamel, jewels, and niello. Moreover, it is used extensively for embroidering silk and other tissues, after being drawn out to an extreme fineness.

In England, up to about fifty years ago, engraving or chasing by hand was an important and artistic industry. The facility to cut or chisel a design with accuracy and delicacy of finish can only be acquired after long tutelage and practice. It was customary to apprentice youths—usually at a substantial premium, returnable in wages—who, for a series of years, devoted that portion of their time not occupied in attendance upon the wants of their seniors, to practising with tools upon copper sheets. Engraving was then an art, for it was not confined mainly to monograms and crests as it is to-day, but embraced covering the surface of large objects like salvers with elaborate designs. The master engraver had to be an expert draughtsman, for he frequently created or adapted his designs, containing scenes of sport, and accurate delineations of animals and flowers. Conventional patterns were used, but the best class of work was original, and not repeated. The writer's father, who employed some thirty men and apprentices, was not only

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master of the mechanical part of his business, but also an accomplished artist. He was accustomed to design services of plate, prize vases, and presentation caskets, etc., upon which ornament was either superimposed by his own hand, or under his supervision. Contemporaries will recall the gentle, spare, white-haired figure, with debonair walk, wearing a black wideawake, planted at a somewhat rakish angle, and an Inverness cape, a *tout ensemble* which gave him a far more Bohemian appearance than was warranted.

An engraver's workshop usually contains a range of benches, and is noteworthy for the distinctive but not unpleasant smell of turpentine and beeswax. The object to be engraved is held firmly by one of the workman's hands upon a leather-covered pad, whilst he plies the burin, the special tool used for his art, with the other. An apprentice needs some aptitude for the trade, otherwise he cannot acquire that delicate touch which enables an engraver to produce almost perfect Italian writing with the aid of his tool, however badly he may wield a pen upon paper. The fineness of the details put a severe strain upon the eyes, and devices have to be adopted, such as oiled paper or globes of water, so as to temper the strong light necessary for such work.

Chasing also is a very artistic occupation. The craftsman employs a variety of tools, which, when struck with the hammer blows differing in intensity by a skilled hand, are calculated to produce many pleasing and varied effects. In those cases when the handiwork is unique, it seems unseemly that the craftsman's name should not be linked with his masterpiece in the same way as is that of a sculptor or painter. There have been modern workmen not unworthy of mention beside Benvenuto Cellini himself. The modern use of machinery, however, has diminished greatly the demand for the chaser, as well as the engraver.

Most museums contain swords, pistols, and cartouche-boxes from the Near East, enriched with chasing. The short curved daggers borne by natives of Eastern and Northern Africa are also thus adorned, or profusely engraved.

Some excellent portraits of miniature size, engraved upon oval plaques, survive from the seventeenth century. The artist has succeeded in reproducing with rare fidelity the features and splendid coiffures of Good Queen Bess and her Stuart successors.

Silver beaten extremely fine has been employed to simulate flowers. The Victoria and Albert Museum has a specimen of such ornamental work, supposed to be of French origin, of the eighteenth century. The design is extremely effective. Around a frame is a lifelike arrangement of buds and flowers, the petals of which are fashioned separately out of very thin plates of metal. The practical impossibility of keeping the metallic surface free from oxidation is a drawback to the enjoyment of such delicate workmanship.

Filigree has been manufactured in many countries, and is still an important industry in Malta and India at the present day. It is particularly suited for chains, pendants, brooches, and crucifixes; but large articles, such as vases of flowers, and even cake or fruit dishes and baskets, have been manufactured in Spain during the seventeenth and succeeding centuries.

In India a large portion of such work is accomplished by children, often no more than eight or ten years of age, the sons or pupils of the silversmith. Their nimble fingers and quick eyesight are indispensable to the success of the work. The master craftsmen prepare the materials and form the frames of the designs. Only the purest silver can be employed, but this is alloyed with a small amount of lead before being used. It is drawn into flat wire, and subsequently twisted on itself to give it the appearance of minute ropes or strings. The frame of a leaf or petal having been made in silver, this is given to one of the boys who cuts the wire into certain required lengths. Each of these he seizes between the forefinger and the thumb, and turns one end round in the form of a half roll.

He then impinges the wire within the frame and adds one after another, until the interior is packed as full as it will hold of rolled up wire. It is then passed on to

the master silversmith, who sprinkles it with soldering-salt, places it on a piece of mica, and holds it in the furnace until the packing of wire becomes welded together and also to the frame. The skill lies in preventing the solder from fusing beyond the desired points of attachment. Leaf by leaf and petal by petal are thus prepared, and then brought together in the completed design. The process of cleaning and whitening the silver is one of great interest, but more or less a secret of the craft.

The peasantry of Russia wear filigree chains and large earrings with several pendant chain-pieces of similar work—resplendent with enamel. Swedish peasant maids used to wear a black corselet laced together with chains fastened to bosses of filigree, with pendant lengths of chain. Old sixteenth-century German chains bore carved figures of saints; the fashion, however, lacked the light and dainty appearance afforded by filigree. Visitors to Switzerland will recall the silver jewellery worn by peasants, especially the bright plates affixed to the head with a remarkably helmet-like effect.

A delicate style of ornament called piqué work has been practised by the French. Fine designs formed of silver are inlaid upon some material, usually tortoise-shell. The objects thus treated are mostly small and used at the toilet, such as boxes and vases, or about the person, such as combs, bracelets, and brooches. Some early Victorian jewellery was produced of a somewhat similar fashion. Jacobites used to affect snuff-boxes of tortoise-shell, upon the cover of which an embossed head of Charles I. was inlaid.

The onlay of silver upon metal had a great vogue in mediaeval times. Weapons, especially firelocks, lend themselves to silver onlay or inlay. The restless Albanian and Balkan tribes delight in possessing guns thus heavily ornamented.

Iron armour of the sixteenth century, particularly the breastplate, used to be embellished with silver. The same style of ornament were often applied to the smaller articles of military equipment, such as the bullet-pouch.

In Persia warriors delighted, and doubtless still delight, in wearing massive daggers furnished at the business end with an evil-looking curve. The handle and cases are formed of crystal, ivory, or of silver. The sheaths are freely enamelled. Matchlocks, scimitar hilts, powder-horns, and pistols are often inlaid profusely with patterns outlined in silver.

The art of onlaying with silver upon baser metals is richly exemplified by damascening, which, as the word indicates, originated from Damascus. The large bowl and jug for ablution, with which the Oriental greeted his guest, has been frequently thus adorned with the usual distinctive patterns of the East. These designs were copied and improved upon by Venetian artisans.

The Japanese carried metal working during the eighteenth and nineteenth centuries to a high degree of excellence. Accounting, as did the Samurai, his occupation as the noblest of all, the beauty of his weapons was the object of his special care. The iron sword furniture was often exquisitely ornamented with the varied designs of flowers and animals. The earliest examples consist of iron alone, or are slightly touched up with gold. During the eighteenth and nineteenth centuries, designs began to be outlined and accentuated with an onlay of silver. A pretty conceit called toad-skin ornament was obtained by fusing minute silver incrustations upon the surface of iron. Small 'companion' swords were often mounted with engraved silver, and the lacquer cases of daggers were relieved with silver flowers. When the Japanese adopted western weapons, they still lavished upon them their artistic taste. Barrels of guns were inlaid with dragon or heraldic designs figured in gold or silver. The latter description of design naturally appealed to a race proud of their ancient lineage.

During the sixteenth century the frames of church doors in Germany were sometimes gilt, and the panels, profusely carved with figures of saints, were silvered over. In a similar fashion church furniture carved in wood, such as crosses and crucifixes, were enriched with casings of precious metal. Many churches in Mexico

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possess chapels the walls of which are covered with carvings too flamboyant for cultivated taste. These are coated with gold and silver. Roman Catholic churches and shrines frequently receive votive offerings of silver from worshippers who feel reason for gratitude for answered petitions. Affixed to the wall are models of hands, ears, heads, or other parts of the human body, some ailment of which had been cured. As the metal is usually very thin, the offering is effective at a moderate expense.

The great period of plating, from the artistic point of view, was the late eighteenth century, when old Sheffield plate was manufactured. The style of design employed was classic. The elegance of the shapes, the delicacy of the handles, and the good taste of the pierced ornament, are remarkable. The exact method of plating, used by the manufacturers of that day, unfortunately has been lost. It is believed that a fine silver plate was superimposed upon a thicker plate of copper, and that the two pieces of metal were passed under rollers until the copper plate emerged overlaid by a very fine surface of silver.

Modern plating is effected by electricity. Silver is dissolved in potassium cyanide. Into this solution an anode of fine silver is introduced, together with the articles desired to be silverised. When the electric current is turned on, the operation takes instant effect. The King's head upon a copper penny assumes in an instant the appearance of that upon a two-shilling piece. The solution in the tank appears quite transparent, and was worth in 1917 about ten shillings the quart.

The beauty of silver objects is sometimes enhanced by the insertion of jewels. Breastplates, vessels, and other large articles are set off in Oriental and other lands by richly coloured stones, but the effect produced is somewhat barbaric.

Niello (derived from Nigello), a black alloy of sulphur, lead, silver, and copper, was used to fill up engraved work upon silver. The contrast of the grey-black insertion with the sheen of silver is very pleasing. The

art attained in Italy a high degree of excellence, owing to the skill and taste of the workmen.

This ancient art survives in one or two localities of Burma. For this purpose only the purest silver can be used. The design is punched, then chased so as to lower the background, and the hollows thus formed are loaded with an amalgam composed of two parts lead and one each of silver and copper. The object is then placed in a furnace stoked with cocoanut-shell, which gives out a dense black smoke, and it is left there until the materials fuse and unite with the silver. The excess colouring matter is rubbed off, and the silver polished, with the result that the design appears with a black background. 'Niello' ware is most effective and permanent, but difficult to make owing to the sulphurous fumes produced during the process. The art appears to have been much more common in the past than at the present time. Among the articles thus ornamented are bowls and plates, dagger handles, repoussé sword scabbards, scent bottles, etc.

There were three methods of gilding practised in the Middle Ages—the first by hammering on gold-leaf; the second by laying a thin plate of gold on a thicker plate of silver, expanding both together, and fabricating the articles out of the sheets thus prepared; and the third by coating the article with gold amalgam of mercury, and subsequently driving off the latter metal by heat. Copper and iron objects, after being coated with sal-ammoniac or borax, were silver-plated by immersion in molten silver.

Many large towns in India, especially those formerly the seats of Mohammedan governments, possess a quarter devoted to gold and silver drawers. The gold, silver, and tinsel spangles that are used so largely with gold and silver embroideries, are called sitaras or taras. The designs obtained by drawing, flattening, spinning, plaiting, etc., by gold and silver wire are innumerable. Adjusted to the purposes in view, they have developed into those distinctive styles of weaving and embroidery that are peculiar to most of the towns of India.

The method of manufacture of wire for embroidery is very interesting. A bar of silver, slightly tapering at either end, say a foot long, and half to three-quarters of an inch in thickness near the middle, is gilded. This is accomplished by wrapping several thicknesses of gold-leaf around it, and placing it in a furnace until the gold fuses and unites with the silver. Thus prepared, the bar is drawn out, and one end inserted within a round opening in a massive sheet of iron, fixed upright. The protruding portion is seized by a powerful clamp and pulled forcibly through the opening. It is returned by the other end to a smaller and again to a still smaller opening, repeatedly, until the gilded silver is drawn out to the thickness of a hair many miles in length. So closely do the metals adhere that, however fine the silver wire be drawn, it will be found uniformly and completely coated with gold.

The wire is then flattened by a hammer as it passes across an anvil. Great skill is required in so adjusting the motion of the wire (or rather row of wires) across the anvil that each stroke of the hammer flattens them uniformly. The next stage consists in winding the flattened wire around a silk thread. This is done in order to make the wire appear larger and thicker than it is, and to impart at the same time the flexible or fibrous quality, as well as the strength, necessary to allow of its being woven.

Silver wire is produced by exactly the same process, except that the bar is not gilded. Pure gold wire would be useless, and what is commonly called gold wire is silver wire gilded as has been described. Imitation gold or silver wires are extremely common, which, though precisely similar to the eye, cost but a fraction of the price. The major portion of the imitation gold wire used in India is imported mainly from Russia. Lyons is an important centre for genuine wire.

An inferior form of gold wire is produced by partially gilding the fine wire as it passes through one of the last of the iron plates. A more serious depreciation is obtained by alloying the silver with a fair amount of

copper. Gold or silver wire of this character is, of course, much cheaper, but tarnishes readily. The richness of effect is heightened temporarily by the use of yellow silk and turmeric, worked into the silk during the winding stage. It is always a sure sign of inferior work if the gold wire be wound so sparingly around the silk as to show interstices. It has been estimated that Delhi alone produces over 300,000 miles of these wires per annum.

The preceding description of the making of embroidery wire and also that of filigree work, have been taken from *Indian Art at Delhi*, 1903, by Sir George Watt.

A FUNERAL BARROW. (*p. 115.*)

CHAPTER XI

VARIED USES OF SILVER

The Bronze Age—Barrows—Ancient Indian ornaments—Troy—Ancient Egyptian stores of silver—The Iron Age—Bosnia—Arabia—Roman Britain—Ireland—Mines and Mints—40,000 silver pillars—Seianti Thanunia and her jewels—Greek craftsmanship—Phoenician traders—Roman table silver—South American aborigines—Church treasures—The Barcelona grille—Modern Black Art—Chinese amulets—Silver missiles—Lively Court Ladies—Music and silver—Surgical appliances—Inside fittings—War and other medals—Furniture—Nefs.

THE use of silver, fashioned into an ornament and not a mere substitute for a pebble bead, dates back to the Bronze Age, which ranged from 4000 B.C. to 1000 B.C. Information as to the life and habits of our ancestors in this far distant period is limited to relics disinterred from the soil, with regard to which conjectures, more or less reliable, have been formulated.

Many silver ornaments have been found in a barrow, a word akin to 'berg,' meaning a hill, used particularly in reference to a grave-mound. It was the custom, from the most ancient times, to bury a chieftain together with his panoply. Many had been stricken in a bloody fray like Sir John Moore, of whose funeral the poet wrote:

> 'No useless coffin enclosed his breast,
> Nor in sheet nor in shroud we wound him,
> But he lay like a warrior taking his rest,
> With his martial cloak around him.'

But that did not by any means comprise the whole ceremony transacted at a barrow funeral. The rites practised in the interior of Africa up to quite recent times, and which have been described to us by eye-witnesses, were evident survivals of these ancient customs. Not only favourite weapons, but also living

favourites, wives and slaves, together with their personal ornaments, accompanied the chieftain to the tomb, made roomy for the very purpose. Many articles of domestic utility and of ornament have been unearthed from funeral mounds, and are now preserved for inspection in museums.

India is considered one of the earliest, if not the earliest, home of the bronze industry. A great find of silver metal work, attributed to this period, was made in 1870 at Gungeria, in Central India. It consisted of a number of thin silver ornaments, some circular, others cut into the outlines of the heads of oxen, besides other articles. Doubts have been thrown upon the extreme antiquity of this find, principally for the reason that silver is not native to India, but it should be remembered that silver was met with very early indeed in Spain, and in other countries adjacent to the Mediterranean, whence these objects may have originated.

In the researches made at Hissarlik, the site of the Homeric city of Troy, where succeeding layers of rubbish indicate various past eras, silver ingots of a tongue-shape have been found in a layer which dates back to 2500 B.C.; whilst nearer the surface, amid material dating on to 1500 B.C., were found silver vessels and beakers, as well as articles of feminine adornment, such as earrings, pins, bangles, etc. Antiquities have also been found in the Cyclades attributed to the latter date.

Numerous silver objects have been disinterred in Spain, known to the ancients as Iberia. The most remarkable of these discoveries were made at a place called El Argar—which seems to have been a prehistoric citadel. Amongst the weapons were daggers, a primitive form of sword, and halberds. A curious feature of these warlike instruments was the use of silver for ornament and for rivets. The latter purpose seems one for which a soft metal like silver is singularly unfitted. The freedom with which silver was used for ornamentation was owing probably to the fact that deposits in this locality were of native silver, singularly free from admix-

ture with base metal. Thus refining—a problem not easy of solution in those days—was rendered unnecessary. The personal ornaments found at El Argar consist of rings, bracelets, and pendants formed out of silver by bending thick wire into a spiral coil. Seven silver diadems were found in the neighbourhood.

The ancients made considerable use of silver for purposes other than personal adornment or utensils. Notwithstanding the comparatively few traces of silver discovered in Egypt, large quantities of this commodity must have existed there, some portion of which was carried out at the Exodus, and utilised for the sacred appliances of the Tabernacle. We read that the sockets of the pillars around the court, the hooks for the pillars and their fillets, the overlaying of their chapiters, as well as the chargers and bowls, were made of silver. Inscriptions of the reign of Thotmes III., a contemporary of Moses, state that amongst his offerings to Amun, the chief deity of Thebes, were 236 heavy ingots of gold, 5 measures of pearls, and 562 talents of silver. Reckoning the talent as £250 sterling, the last item alone equalled a sum of £140,500.

On the whole, traces of silver industry in the Bronze Age were very slight—it is rather to the Iron Age, 1000 B.C. to 400 B.C., that we must look for more frequent discoveries of silver treasure, for, by this time, some advance had taken place in separating and working the different metals.

In 1892 excavations were made in Behac in Bosnia, in the course of which 550 graves were uncovered, and a quantity of rings, chains, and brooches were brought to light. In the Iron Age the two later descriptions of ornaments appear for the first time, and glass and amber are also represented. A silver brooch of this period, singularly ornate in character, was found at Great Chesterford in Essex.

The art of inlaying with silver was practised very early. An axehead of Bactrian bronze work, attributed to 400 B.C., has been unearthed. The design is very bold, and represents a tiger attacking an ibex; the stripes on

the tiger are of silver let into the bronze. The highly ornamental character of the work probably indicates that it was intended as a votive offering.

A step still more advanced in handicraft was shown, at the opening of a grave in 1879 at Birdlip, near Gloucester, where, amid a quantity of bones, lay a fine silver-gilt brooch with spiral spring, pierced catchplate and hook on the bow, recalling a type assigned to the first half of the first century A.D.

The finds, chiefly in sepulchres, of silver articles in the British Isles during the Roman occupation are very numerous. By far the greater number have been taken from burial-places, and the antiquity of the specimens is identified, in many instances, by coins lying close by.

At Chorley, brooches, massive in workmanship, and remarkably like miniature doorknockers in appearance, have been found, together with a chain of platted hair pattern. A utensil of a modern milk saucepan shape with florid ornamented handles, spoons not unlike modern mustard spoons in outline, together with a mirror, possessing a smooth silver face, were discovered in the vicinity of three coins, the date of which was 139 A.D. Silver collars have also come to light lying near coins belonging to 161 A.D.

The mounting of signet rings, those easy substitutes for skill in penmanship, were frequently made of silver. Horse-trappings of bronze have been found silver-plated. At Mileham in Norfolk, a fine silver dish about fifteen inches square was found with a beaded pattern round the border. The centre was sunk and moulded in a circular form. These trays or dishes must have been fairly common, as pieces of like fashion have been found elsewhere in the country. At Coleraine, County Derry, ingots of silver, absolutely identical in shape with those marketed to-day, were taken from the soil, together with fragments of Roman spoons. The centre of a bronze bowl was unearthed at Faversham, bearing a finely modelled Medusa head inset with staring silver eyes.

In both the Bronze and the Iron Ages, the charm of

these unearthed silver objects to their possessors had evidently lain in the pleasing appearance of the metal itself rather than in the workmanship. True, a certain amount of care was devoted to the shape, and some embellishment was attempted by incised lines, but, as a whole, the question of utility seems to have been the chief consideration which dominated the mind of the man who fashioned the article. The earliest specimens of handiwork were formed probably from nuggets of pure silver, or from silver separated from silver-lead ore by mere chance.

The value of silver, as something that lent itself readily to the hand of the skilled craftsman, awaited the time when cities came into being, and civil communities arose where merchandise could be warehoused, and displayed for sale with safety. Manufactured silver goods found their way to nomad tribes, either by way of plunder or by peaceful barter, but, as a general rule, artistic silverware has been, and still is, a feature of city life.

A master mind and hand can mould objects of aesthetic pleasure, whether slim, massive, grotesque, plain, or rich with ornament. The true craftsman possesses the power to implant, as it were, his personality into lifeless material, and to delight for ages afterward the seeker after beauty. His genius lies in turning the commonplace into the ideal.

Coincident with the advance of metallurgy, almost alongside of the mines themselves, skilled workmen prepared silver articles for trade, and, in the neighbourhood of mines, the first mints were set up. Many ancient, as well as many modern cities have owed their existence to their proximity to ore deposits, and have grown up as natural markets for the disposal of the newfound wealth.

During the Mycenaean period some magnificent work was applied to daggers, which were inlaid with silver or gold upon enamel. It appeared to have been a very artistic period, for realistic battle scenes were freely embossed upon vases.

In ancient Egypt the separation of silver from gold does not appear to have been seriously desired, for much of the jewellery, a composition of both metals, is a pale golden colour. The articles comprise amulets, flat pendants for hanging to a necklace, as well as tiny bells and other trifles, such as seals.

The amiable and portly lady 'Seianti Thanunia,' wife of Tlesna, whose clay effigy is seated gracefully upon her tomb in the Etruscan room of the British Museum, presents an epitome of the personal use of silver in her time. Her disconsolate spouse placed in the sepulchre models in thin silver of her toilet requisites; these have been exhibited within the case: the pomade pot, whose contents fixed firmly down upon her head the small close curls of her hair, the vase which supplied the water for her toilet, the scent bottle from which fragrance suffused her garments, the strigil that was borne by her slave when she attended the public baths, and finally the mirror of burnished silver (of which a plaster replica is held in her hand), by means of which she surveys her somewhat massive charms.

A tiara is modelled upon her head, maybe of silver, more probably of gold. A thick hollow serpentine bracelet surrounds her wrist, an exact silver specimen of which may be seen in another room. Around her arm is a flat encircling band, probably of the same metal. The catalogue is not yet complete, for she wears earrings, and upon her hand there are no less than six rings, some at least may have been of silver, two each upon the third and fourth fingers, one upon the first finger, and a particularly massive one upon the thumb. It is quite possible that the piece of ornamentation around her throat is a necklace with small pendant tassels, also of silver. The custom was to fasten the robe over the shoulder with a silver fibula or spring clasp brooch. Brooches of the same period can be seen elsewhere, of a shape not unlike those used in Britain at the time of the Roman occupation.

The ancient Greeks impressed their keen artistic taste upon their jewels as well as upon their coins.

Armlets were sometimes flat, adorned profusely with pleasing designs in relief, either gilt or plain, and fringe and flower drops were attached. Vases were heavily embossed with designs of a florid description.

Plaques, apparently stamped, but of excellent design and finish, were a speciality of Rhodes. Well worked heads, of knops and ridges, were affixed to pins—similar to that modern female weapon the hat pin—some of which were five inches in length. Bracelets were made very solidly, with ends composed of lion heads in gold.

Those able merchants, the Phoenicians, traded with their elegancies in the way of jewellery as far as Britain. Sir Frederic Leighton's fine fresco in the Royal Exchange depicts the superb scorn with which the acute merchant depreciated the magnificent furs proffered by the Britons in exchange for the gaudy trifles with which he had freighted his cargo. Silver signet rings were a great bait to the innocent islanders, and one can imagine their delight at the cameo design impressed upon a piece of wax. Larger rings of silver, made to act as a pendant from a necklace, doubtless were represented as an absolutely necessary adjunct to the trousseau of any self-respecting British maiden.

A number of pieces, cut off a small silver ingot and weighing perhaps a quarter of an ounce each, have been discovered and attributed to this period, namely, 600 B.C. Probably in nowise different were the twenty pieces of silver for which the youthful Joseph was traded to the merchants.

Fortunately, several silver services for the table have survived from the Roman period—third century A.D.—and can be viewed in the British Museum. The set comprises a flat salver, a bowl suitable for fruit, small plates and cups without handles. A flagon of quite modern appearance, a 'situla' (? soup bowl) and a ladle, the bowl of which was finely perforated, also formed part of the table equipment. The designs of the latter group of vessels are ornate, but those of the salver, plates, and cups are severe; one salver has the 'swastika' design in the middle. Spoons, spindles,

and brooches, etc., have been found composed of the same metal.

Small solid statuettes of human forms and of animals, ranging from one to four inches high, seem to have been fairly common. Pins frequently had a tiny statuette placed at the stem. Pious sentiments, or, as we should say in modern phrase, aids to devotion, were imprinted upon thin silver strips and worn as amulets. Delicately formed silver wreaths were often deposited in tombs. On the cuirasses of soldiers were affixed silvered bronze bosses, upon which appeared the emperor's bust.

Several very fine and comprehensive collections of ancient Roman silver antiquities have been unearthed during the last century. Notably amongst these figure a group discovered at Bernay in 1838, now housed in the National Library of France. A remarkable collection was found at Hildersheim in 1868, embracing table plate, jewellery, and articles of vertu, now exhibited in Berlin, reproductions of which are to be viewed in the British Museum. Quite recently similar treasures were found at Botto Reale in 1895, and placed in the Louvre at Paris.

The inhabitants of ancient Peru were much more successful in plastic art than they were at working in metal. If they had only turned out vessels in silver as lifelike and amusing as those they fashioned in pottery, they would have taken high place amongst metal workers. Vases do exist, intended to represent the human form, but the resemblance is stilted and remote. Domestic utensils of silver were mostly bowls of simple shape. Silver ornaments for the person were very rudimentary. The natives upon the coast used to hang tiny plain plates, about three-quarter inch square, upon their tunics, possibly for the sake of the jingle and the glitter.

The Spaniards found metal working active at the time of their occupation of Mexico, but there is no reason to believe that the aboriginal inhabitants made any use of silver comparable to the artistic workmanship of Greece and Rome, in the centuries immediately before and after the Christian era.

Probably the most massive silver ornaments ever

fashioned for wear upon the person are carried by some Arab females of Upper Egypt. These are solid circlets, styled halahils, three-quarter inch in diameter, and weigh 1¼ lbs. troy. They are borne one upon either leg. Such gifts may be taken as marks of attachment in a twofold sense, for a wife must find it difficult to run away from a husband who has given her such weighty proofs of his affection.

Silver has been employed extensively for the embellishment of royal palaces. In 1915 our troops fought an engagement in Mesopotamia at Ctesiphon upon an ancient battle ground, near which stands the so-called arch of Ctesiphon, all that remains of the splendid palace reared by Chrosroes, the Persian king of Parthia. The edifice was said to have been supported upon forty thousand silver pillars of diverse beauty and ornament. Doubtless the pillars were only overlaid by silver, but their existence testified to the large amount of plunder acquired in the course of his victorious campaigns.

From the days when the Tabernacle was raised by the Israelites in the wilderness, if not before, silver has been associated with places of worship. The treasuries of great cathedrals, such as that of Notre Dame in Paris, hold countless pious offerings constructed of silver, presented by royal and other visitors. Silver screens abound in Malta and other Roman Catholic countries.

Spain, in connection with religious buildings, retains abundant evidence of the wealth of precious metal which poured into the country during the period that the territory, now independent—under the style of the Republics of Mexico, Peru, Chile, and Bolivia—formed part of the Spanish colonial empire. A feature in the great cathedrals of Spain is the high altar, which graces the centre of the building. In the majority of cases this is surrounded by an iron grille, frequently of elaborate design. The grille of Barcelona Cathedral is black like iron, but artificially so. It is really composed of solid silver painted over, and portions have been cleaned in order to display the fact. When Spain was overrun during the Peninsular War by the French armies, the

commanders of the enemy forces did not scruple to pillage churches, any more than they did private buildings, of anything that seemed to be of value. Marshal Soult, it will be remembered, specialised in pictures, but probably the Barcelona grille would also have attracted his sincere admiration. In order to protect it from such embarrassing attentions, the authorities conceived the idea of painting this screen and thus simulating the iron erections which surround the high altars of other cathedrals. The ruse met with commendable success.

In the days when books were of great value owing to the high cost of production, silver covers of very handsome workmanship were added for their protection. The attention of the visitor to mosques in eastern lands is attracted by the profusion of silver lamps—donations of the faithful—suspended from the roof. So many in number are these, that sometimes, as in the Citadel Mosque at Cairo, they present the appearance of a silver ceiling. In this building stands the tomb, richly adorned with the same metal, of Mehemet Ali, the able first Khedive of Egypt.

Silver offerings are made to those who practise the fortune-telling cult. The gypsy will not impart her dubious prophecies until her hand has been crossed with a piece of silver.

According to the *Pioneer Mail* of Allahabad, it lends its aid at the present day to the practice of the Black Art. 'Devi Din,' the necromancer, had himself suffered the pains of ghostly visitation. Whilst still a youth, he had married a bride who in due course presented him with a daughter, a gift she kept repeating at decent intervals until Devi Din was the father of six children. But there was never a boy amongst them, and at last the wife passed the age of child-bearing. Devi Din then raised the question of a second matrimonial venture, pointing out that as he had no son he would be well within his rights, according to the custom of the hills, in taking another wife. But she would not give her consent. 'It is the will of God that I have no son,' said she, and presently swallowed a fatal dose of opium. The

widower, surmising that her spirit would return, did what he could to comfort it. He gave her a very handsome funeral, feasted Brahmins, friends, and relatives on a liberal scale, and even carried her bones to the Ganges. A few weeks later, however, he was afflicted with boils, proof that the spirit of the suicide had found him out. Then began the weary business of propitiation; but at last he laid the ghost and cured the emerods by making a silver image of his late wife. This he kept in his house, and worshipped it regularly on certain days of the month. He also made it his 'tutelary genius,' calling up the spirit and conversing with it at will. Finally, he adopted necromancy as a profession and soon established a reputation for dealing with the nether world through the medium of his wife's silver image.

In China there exists a worship of beings who frequent the spirit world, and many methods are used to avert or propitiate their evil influences. The irregularity of the streets, and the characteristic upturned angles of the buildings are attributable to a desire to baffle the bad spirits who, in China at any rate, are considered to be awkward at turning corners—the road hogs, as it were, of the unseen world. Charms are worn frequently in the shape of silver necklets, bracelets, and anklets. Those considered most efficacious are fashioned from iron coffin nails covered with silver and made into ornaments. Boys as well as girls wear them. They are more often seen in South than in Central China. A little boy dressed in nothing more than a pair of blue cotton trousers and a large silver necklet presents an amusing spectacle to Western eyes.

A father sometimes collects a few cash from a hundred different families in order to purchase silver with which to make what is called 'A hundred families cash-lock.' The silver is made into a little padlock, which is worn on a chain around the child's neck, and by this means he is supposed to be attached for life to the hundred contributing families, who will be interested in securing that length of days which is the especial ambition of the Chinese.

In mediaeval times it was the practice to use silver bullets because they were thought more deadly than those of lead, but silver articles have also been used as missiles without special premeditation should they chance to be the handiest. An old couple went to see the coronation of Queen Victoria at the Abbey. The good lady was rather advanced in years, and was so overcome by the exciting events of the day, that when seated at the meal table on her return, her senses suddenly left her, and she threw the silver teapot at her astonished husband's head, and never recovered her wits.

There are few articles too out of the way to be fashioned in silver. About twenty-five years ago consignments of silver-ware used to arrive periodically from Peru. These had to be broken up and defaced before the British Customs would allow them to enter without payment of duty. They consisted of horses' bits, villainous shovel stirrups with sharp edges that could rip open the flanks of a horse, besides basins, jugs, and other articles of strangely familiar shape for the bedroom. The liberal use of silver for articles not considered to call for honour is not confined to Peru, for some lively ladies invited to the French Court during the Restoration derived intense amusement from the sumptuous completeness of the toilet arrangements of their retiring rooms.

Miss Grace Ellison, narrating her experiences as a guest in a Turkish harem previous to 1914, mentions that her washstand was furnished with 'a solid silver basin and jug of real Eastern shape,' and that the rest of the toilet service was French, presumably of China ware. Many substantial silver elegancies of this description may be hidden in the harems of Muslim lands. From the earliest times the toilet has been served with looking-glasses and other useful adjuncts, and the feminine mind in the East and elsewhere still delights to affix silver articles in lip and ear.

The charms of music are enhanced by the employment of silver. Two silver trumpets, all of one piece, were used to direct the movements of the Hebrews during their journey to the Promised Land. To-day, hunting and

coach horns, bugles, trumpets, and cornets are made of sterling silver throughout, and sometimes flutes and kettledrums. The keys of wooden instruments such as flutes, clarinets, and oboes are frequently of the same metal. Silver solder is much used in building up the different parts of the above. Brass instruments are frequently electro-plated, and, when massed together, present the pleasing appearance and melodious tone of what is commonly called a Silver Band. It has been considered of old that a certain proportion of silver improves the tone of church bells, and it has been a custom for onlookers to throw silver coins into the molten metal before it was cast.

The most important commercial product of silver is nitrate of silver, or lunar caustic. This preparation is used principally for photographic purposes, for silvering glass, and for surgery. It is also applied internally for gastric ulcers, and in weak solutions for cases of granular ophthalmia. Continuous application produces a darkening of the skin. Silver in other combinations such as organic salts is applied to mucous membranes when a certain action is required.

It is said that fine silver leaf is used in India for medicinal purposes—for modern surgery the demand is constant for skin grafting. Wounds are sewn together with silver wire, and bones bound with silver bands. Silver tubes are inserted for temporary or permanent use, whilst a great number of surgical instruments owe their cleanliness and delicacy to this most useful metal. Missing parts of the skull, nose ear and tooth are replaced with silver, and even larger portions of the anatomy. Mr. Gerald Campbell in his *Verdun to the Vosges*, states that General von Haeseler, the idol of the German troops, an idol not wholly of flesh and blood but partly composed of precious metal, is ' a man of iron will with ribs of silver, which he wore in place of those he lost in the Franco-Prussian war.' Curiously enough, the beau ideal of the French army some years ago was constructed of the same composite material. General Galliffet was treated by a shell at the siege of a Mexican town some-

what in the same manner that a horse is treated in a Spanish bull-fight. After being thrown into a ditch by one party of rescuers and dropped by another party, he reached eventually the surgeons, who patched him up in such a way that he became known as ' le Général au ventre d'argent.' With this slight handicap he fought the Arabs under the grilling skies of Algeria, and led a magnificent cavalry charge at Sedan. After which he returned for a while to the desert and the Arabs, and lived happily afterwards despite the silver stored within his interior.

A quantity of silver has always been manufactured into war medals. The amount required to commemorate the Great War will undoubtedly constitute a record. Similar decorations are given for excellence in sport, or other branches of human activity. It used also to be the custom for sworn brokers of the city of London to hold silver medals, the production of which was necessary before any transactions could be considered legally closed. Six medals, representing eight generations of his name and family, are in the possession of Mr. M. A. N. Lindo, who became a sworn broker in 1884, after the practice of issuing these medals ceased. The first of these medals, dated 1697, was granted upon payment of a fee of £1500; only twelve Jewish brokers were then allowed to practise. In 1888 the registration of sworn brokers was abolished.

A considerable number of vessels, etc., for domestic use have been already mentioned, all of which in some form or other are still fashioned in silver. The middle-class home of the present day contains silver articles in far greater variety than obtained at any past period of human history. The abundance with which silver was introduced into Europe from the New World during the sixteenth and seventeenth centuries led to a profuse use for large pieces of furniture. In most cases the objects are not solid, but composed of wood or other material overlaid with thick silver plates. Tables, chairs, and the framework of large mirrors, dating from the time of Charles II., are to be seen at Windsor and Welbeck Abbey.

AN ANTIQUE NEF.

12½ inches high. The work of Esaias Zur Linden. of Nurnberg. 1609 A.D.

(*p. 129.*)

Amongst continental castles, where similar treasures are to be found, may be numbered Rosenborg Slot, in the neighbourhood of Copenhagen. Here may be viewed furniture, constructed partly or wholly of silver, and curious representations of various animals. The effect is more barbaric than pleasing.

Ornamental pieces of silver plate called nefs, fashioned in the shape of ships, were manufactured during the sixteenth and seventeenth centuries, and are much sought after by collectors. Most, however, of the nefs extant are modern and owe their origin to Germany or Holland, as also do the antique specimens. Since the outbreak of war, Messrs. D. and J. Wellby, Ltd., have produced excellent nefs of British handiwork. One vessel is parcel gilt, made after a drawing in the Royal United Service Institution, Whitehall. It represents the *Marie Rose*, the first battleship to carry large guns, launched in the reign of Henry VIII., and ultimately wrecked off Sandwich.

CHAPTER XII

SILVER PLATE

Church specimens—Jewish Scriptures—Mass books—Table service, tempo Henry VIII.—Elizabethan treasures—Venetian glass—The Civil War—The Restoration—Exports to East Indies—Wine coolers—Spoons—The Salt—Lovecups—Tankards—Maces—Hall-marks—Pillory—Alloy—Sterling—Celebrated sales—High prices.

THE original meaning of the word 'Plate'—derived from the Greek πλατύς our own word 'plat'—and akin to the Spanish 'plata,' was the flattened metal, but in the course of time it came to signify domestic and other vessels formed out of precious metal.

Old English plate, prior to the discovery of silver in the Americas, consisted mostly of objects used in the service of the Church, which were usually presented by pious worshippers. It should be remembered that the Church was the nursing mother of the arts and sciences in mediaeval days, and the display upon the altar of a cathedral or important parish church upon festive occasions must have been imposing. The visitor to Paris gains some idea of this when he pays his franc to view the treasury of Notre Dame. For this reason the visitor to any great museum will find, as at the Victoria and Albert Museum at South Kensington, mediaeval art represented largely by sacred vessels composed of silver. Among these will be found specimens of chalice, flagon, and paten, and of the pyx, censer, chrismatory, and pax, and also sacred images and the covers of mass books formed of the same metal. In this connection may be recalled the silver finials to the staves upon which the Scriptures in the synagogues are rolled, and the Sabbath lamp used in the home. The image of St. Stephen, taken from the church of that name at Westminster, in the time of Henry VIII., weighed 273 ounces of silver, whilst in 1552 St. Olaves, Southwark, owned a gospel book whose cover weighed 122 ounces, and an epistle book whose case weighed 100 ounces—cumbersome aids to worship these!

A MAZER BOWL. (*p. 130.*)

6 inches high and 11¾ inches in diameter. Restored XVI. Century, but containing an original portion dating back to XV Century.

The latter church at that time possessed silver objects for sacred use weighing altogether no less than 1062 ounces. The seizure of church plate was not decided upon until the last year of King Edward VI. The church authorities frequently disposed of valuable property in the precious metals about this period in order to meet the damage done to their painted glass, etc., in an excess of puritan zeal, and thus their rich stores of silver goods, which would have been priceless at the present day, were greatly depleted.

The bequest of Sir John Heron, Kt., Treasurer of the Chamber of King Henry VIII. in 1525, 'My daily usual plate being in my buttery, that is to say, three saltes silver with a cover, xxii of Silver spones, two standing cups with ij covers gilt, three goblets with a cover and ij white bolles of silver oon pounced and the other playn,' show what the testator considered necessary for his widow's use, out of his store of plate.

The choicest specimens of plate have been rescued from the century beginning with the reign of Henry VIII., and ending with that of Elizabeth. Harrison, in his *Elizabethan England*, says that in his day 'The furniture of our houses also exceedeth and is grown in manner even to passing delicacy, and herein I do not speak of the nobility and gentry only, but likewise of the lowest sort in most places of our south country. Certes, in noblemen's houses it is not rare to see abundance of arras, rich hangings of tapestry, silver vessel and so much other plate as may furnish sundry cupboards to the sum oftentimes of a thousand or two thousand pounds at the least.' A vast sum in those days!

Writing of the improved condition of the working men, he remarks, 'The third thing they tell of is the exchange of vessel as of treen (wooden) platters into pewter and wooden spoons into silver or tin.' He also refers to the excellent looking-glasses of English tin which were '. . . very highly esteemed of till silver came generally in place, which in the end brought the tin into such contempt that every dishwasher refused to look in other than silver glasses for the attiring of her

head.' Thus the very superabundance of silver caused it to be held in light esteem.

Harrison also states: 'It is a world to see in these our days, wherein gold and silver most aboundeth how that our gentility, as loathing these metals (because of the plenty), do now generally choose rather the Venice glasses both for our wine and beer than any of those metals or stone wherein before time we have been accustomed to drink.' By this phrase we gather how the men of that heroic age escaped the pitfalls which sapped the great Roman Empire and destroyed the colonial dominion of Spain. Their hardihood and good sense saved them from mere display and luxury which has wrecked, and always will wreck, nations as well as individuals that yield to sloth, and are content to rest when once success has been attained.

The Civil War made great havoc of the plate possessed by the English people. Patriotic folk not only hazarded their lives, but also their treasure, for the King or for the Parliament. Wherever the dogs of war were let loose, they ferreted out every silver article which could be converted into coin.

In the seventeenth century patriotic folk sacrificed their plate for King or for Parliament, but at the Restoration, the titled rich, and even the middle classes, vied with each other to replace their lost vessels to such an extent that even tavern keepers provided silver cups for their customers. Two evils resulted from the practice, the silver coin of the realm was melted for the purpose, and the supply of currency ran short, and such an increase of burglaries and offences of violence set in, that the Grand Jury of Middlesex made a presentment to the Crown that the use of silver for basins, tankards, and cups in public-houses should be prohibited.

In 1718 the large export of plate to the East Indies was commented upon in Parliament, and it was stated that in the preceding year the East India Company had exported no less than 3,000,000 ounces, a large amount indeed in those days, and one far in excess of the imports of that year.

Account books preserved by Messrs. Garrards recorded sets of plate made between 1712 and 1720, which ranged in weight between 7000 and 4000 ounces. The service sometimes comprised a cistern and fountain weighing 2000 ounces, the weight of which it must have required a genius like Raffles to burgle. The immense services of plate considered necessary in the middle of the eighteenth century must have been the cause of much melting down of earlier specimens, for by that time supplies from Spanish America had been much reduced.

The Czars and aristocracy of Russia have possessed an abundance of early Georgian plate, amongst which were wine coolers of great size, and weighing some thousands of ounces. One enormous specimen, dated 1734, weighed 8000 ounces, the value of which for metal alone was £2000 at the date of manufacture.

The commonest silver article in use for the last six hundred years is the spoon. Those of the thirteenth and two following centuries had stems ending in a plain knob, or an acorn. In the fifteenth century the head of the Virgin Mary was placed at the end, and they were therefore named maidenhead spoons. Early in the sixteenth century Apostles spoons appeared, and remained in great vogue for a century and a half as christening gifts. The flat form of handle came into use in the eighteenth century.

Silver bowls or mazers are of equal antiquity with spoons. An inscription in Latin frequently adorned the rim of these vessels. Covered cups of the fifteenth century carry their heraldic inscriptions, which are considered to indicate their German or Swiss origin. The illustrations of the beautiful cup and mazer are remarkable evidence of the fine taste of our forefathers.

The salt was a very notable vessel indeed. Its situation on the table denoted the rank of those present as above or below the salt. New College, Oxford, possesses a salt of a specially noble Gothic design, dated 1493. In later years the classical style became more favoured, especially among guilds and corporations. Trencher salts, a simple depression in a square, triangle, or circle, are valuable curiosities. One was sold for £30 in the year 1875.

Stoneware jugs used to be elegantly mounted and handled with silver in the time of Queen Elizabeth. Ewers and salvers were of an elaborate character in the same period, and for some centuries afterwards.

Lovecups for use on festive occasions at corporation and guild dinners show great variety in design. There is a beautiful specimen in the chaste style of Flaxman amongst the treasures of the Merchant Taylors Company.

The first use of the word 'Tankard' in regard to a piece of plate is traceable to the year 1575—before then it was only applied to the wooden tubs bound with iron in which water was carried. From this date, drinking vessels of a flagon form with a hinged lid became common. Some were quite weighty—the records of the Clockmakers Company mention a pair weighing together 100 ounces, which cost £31, 19s. 5d. Amongst small vessels were cups and porringers.

Silver plates came into existence first as dessert and spice plates. One of the earliest mentions dates back to 1358 A.D. Forks were a much more modern invention than spoons. The first had only two prongs, were supposed to have been introduced from Italy about the beginning of the sixteenth century, and were intended for eating pears or green ginger. Punchbowls, candlesticks, toilet furniture, cruet stands, and tea and coffee services follow in quick succession, and such articles as snuffers, scissor handles, wine labels, and punch ladles with horn handles. Finally, a mention must be made of the massive and often very beautiful maces which grace parliamentary and civic processions. The above list of articles gives some idea of the important place which silver occupied in the home and public life of the Middle Ages, adding to the dignity of sacred and civil functions, as well as conferring elegance to the appointments of the table.

The ancient guilds of England and of France were empowered as early as the thirteenth century to protect the quality of plate. This was done by special marks —which guaranteed the fineness of the metal employed— the fraudulent use of which was severely punishable by law. By means of these and other marks, the place,

THE RICHMOND CUP.

12⅔ inches high—attributed to the latter part of the XV. Century.

(*p. 134.*)

period, and even the actual maker of the goods can be verified. Set variations of these marks were authorised purposely for the protection of the trade.

The Goldsmiths' Guild in London was incorporated in 1327 by letters patent from Edward III. under the name of 'The Wardens and Commonalty of the Mystery of Goldsmiths of the City of London.' The Guild embraced the silversmiths as well as the goldsmiths. Offenders against the statutes of the Goldsmiths' Company had to pay dearly for wrongdoing. On the 4th May 1597 an information was filed against two men of making counterfeit plate lower in quality than the standard, and they were duly convicted and sentenced to stand at the pillory at Westminster, with their offence written above their heads, and their ears nailed to the posts. Afterward they were taken in a painful procession to Fleet Prison, in the course of which each had one ear cut off, and a fine of ten marks was inflicted.

The following is a specimen of the regulations enacted for the protection of the public and the trade. 'Also it is ordeyned that no Goldsmith of England nor nowhere else within the realme work no manner of vessel nor any other thing of Gold or Silver, but if it be of the verry alloy according to the Standard quality of England, called Sterling Money or better.

'That no manner of vessel or any other thing be borne from the hands of the workers nor sold but it be assayed by the Wardens of the craft or their deputy, the assayer ordained therefore, and that it be marked with the Lyperde's Head crowned according to the acts of diverse Parliaments, and the mark of the maker thereof.'

The chronological order of the marks upon silver objects is as follows:

1. The Leopard's Head	from 1300.
2. The maker's mark	from 1363.
3. The annual letter	from 1478.
4. The Lion passant	from 1545.
5. The Lion's Head erased and figure of Britannia	from 1697.
6. The Sovereign's Head	from 1784.

The word alloy has been thought to owe its derivation to the expression *à la loi*, but since the French describe the composition as *alliage*, alloy may have come from the latter word. Copper has been found by experience to be the best alloy for silver. An addition of one part of copper to four of silver brings the combination of the two metals to the greatest possible degree of hardness. Whenever standard or sterling silver is mentioned, metal containing 925 parts out of 1000 of pure silver is intended. The word sterling is considered to refer back to the inhabitants of Eastern Germany, or Easterlings—as they were designated in the twelfth and thirteenth centuries—from whom silver, famous for its purity, was sent into the world's markets.

This chapter may fitly close with some reference to the enormous figures—nearly £300 the ounce, one thousand times the original cost of the silver—at which unique pieces of silver have changed hands. It must be remembered the smaller an antique article is, the more likely is the price per ounce to be high. Messrs. Christie, Manson and Woods, the celebrated auctioneers, who have sold the most valuable of such rarities, have been good enough to supply the following information:

'It is probable that the celebrated Tudor cup sold in the Dunn-Gardner Sale in 1902 still holds the record price per ounce, as it realised £4100, and only weighed 14 ounces 3 dwts. It was purchased by Messrs. Crichton Brothers. There is a very similar cup in the collection of Lord Swaythling now at the Victoria and Albert Museum. In the Ashburnham Sale in 1914, the Henry VII. standing-salt sold for £5600 and weighed 30 ounces. Messrs. Crichton were the purchasers of this also.'

Plate only two centuries old commands high figures. The following is taken from the *Times* of 29th June 1916:

'A sale of old English silver at Christie's yesterday included a small chocolate box, which sold at 380s. per ounce—£176, 13s. (Crichton); and four George I. trencher salt-cellars, by W. Scarlett, 1717, at 260s. per ounce—£181, 13s. 6d. (S. J. Phillips).'

CHAPTER XIII

FLOTSAM AND JETSAM

The West Indian packet—Inward record shipment—Captain summoned—Outward record—Why pack silver?—Shipwreck of *Oceana*—Davy Jones's locker—Silver recovered—Bolt from the blue—Christmas Eve on the river—A funeral wreath—The railway strike—Child's play—Silver and submarines—The *Sussex* torpedoed, and a sequel—A French shepherdess—Silver smugglers—Church refining—Silver profits—Ennobled miners—Earthquakes and forest fires—Horse more celebrated than master—God's Gift—The salt carters of Freiburg—Gnomes, good and bad—Lake draining—Indian hoards.

REFINING plants have been erected in close proximity to the principal mines within the last fifty years. Previously, the bulk of the world's production, which at that period used to be derived from Mexico and South America, was shipped to this country for reduction as well as for realisation. In those days the arrival of the West Indian packet, as it was called, meant most strenuous business for all concerned, and entailed work night and day for melters and refiners until the whole shipment had been dealt with. Fortunately, the three weeks' interval before the arrival of the next packet gave an opportunity for needful rest.

The largest values conveyed by the Royal Mail Steam Packet Company steamers from the West Indies, etc., to England were by the two following vessels :—

By the S.S. *Tasmanian*, which arrived 28th September, 1860.

Silver	£1,186,760 13 1
Gold . . .	56,253 6 10
Total . .	£1,243,013 19 11

The above consisted of 2124 packages, weight 156¼ tons,

conveyed to the Bank of England in 36 wagons and vans with 113 horses.

The amount of the shipment by the s.s. *Tasmanian* constitutes a record for silver imported upon any one ship considered by value.

By the S.S. *Shannon*, which arrived 30th August, 1864.

Silver . . .	£1,000,525	8	4
Gold . . .	510,900	2	8
Total . .	£1,511,425	11	0

On this occasion there were 2207 packages conveyed to the Bank of England in 41 wagons.

The total weight of the s.s. *Shannon* consignment would approximate that of the s.s. *Tasmanian*, in view of the different proportion of gold and silver in the respective ships. On arrival of each ship's consignment at the Bank of England, the whole of the packages had to be weighed singly, the time taken being seven days.

The treasure conveyed by the s.s. *Teviot*, which arrived from the West Indies some time in 1858, took 18 four-horse vans to convey it from Nine Elms to the Bank of England. Owing to the large number of road vans required, the streets and traffic became blocked, and the commander of the ship had to appear at the Guildhall to answer a charge of obstruction.

The Peninsular and Oriental Steam Navigation Company hold an easy record for outward bound shipments. On 6th December 1912 the s.s. *Macedonia* left with the following prodigious cargo of bullion, the insurance of which taxed the underwriters to their utmost. She carried 7628 bars and boxes of silver, and 108 boxes of gold, the value of which was declared as follows :

Bars (Silver) . . .	£1,010,000
Coin „ . . .	80,000
Bars (Gold) . . .	113,250
Coin „ . . .	394,300
	£1,597,550

FINIALS FOR TORAH SCROLL.

(*p. 138.*)

The total weight of bullion was 262 tons. Although the shipment of silver by s.s. *Tasmanian* exceeds this in value, it was only $\frac{3}{8}$ of the weight owing to the higher value of silver in 1860.

Silver bars now travel mostly in a refined condition from the Americas to London, and thence to India and China. Up to about twenty years ago consignments to the East were always packed in London, one bar in each box, until it occurred to a clerk with an inquiring mind to say, 'Why pack them?' The 'Why' had long since disappeared with the cutting of the Suez Canal. Before this event silver had to be landed at an Egyptian port in the Mediterranean, and to be laden on camel back for transit across the Isthmus of Suez, where the P. and O. packet waited its arrival. For this land journey packing was a necessity, and silver coin had to be soldered up in a tin-lined box, for the Levantine camel driver was a born pilferer. Silver bars now travel naked all the way from London to India or China in the strong rooms of the steamer. Not always undisturbed, however. Father Neptune takes care of that.

On the 15th March 1912 the good ship *Oceana* left Tilbury with a more than ordinarily substantial load of bullion, viz.: 4138 silver bars valued at £551,640, 46 boxes of gold, containing coin worth £21,470, and bars worth £174,500. The total shipment—to the value of £747,610, weighing altogether 140 tons—was snugly stowed far below decks. The voyage for Bombay commenced with the machine-like regularity acquired from long experience in linking together Great Britain and the great Empire of India. At about four o'clock on the following morning the liner collided with the German barque *Pisagua* off Beachy Head. The *Oceana* was badly damaged, and although assistance was quickly forthcoming, and efforts were made to tow the vessel to Dover, she sank at ten A.M., two miles west of the Royal Sovereign Light in water twelve fathoms deep. The salvage operations, commenced immediately by the Liverpool Salvage Association, were much delayed by bad weather, and dragged on for some two or three months. With the

exception of two bars, all the bullion was recovered. Divers extracted the bars and boxes and placed them into baskets which were raised by derricks and tilted into the craft alongside. There were heartburnings, however, in two quarters, namely the underwriters and the unfortunate consignees. Although the latter recovered the value of the submerged silver, the buyers in India, to whom they had contracted, contrived to corner the market for delivery, and the sellers, caught unexpectedly short by the disaster, had to pay heavily for their inability to fulfil their contracts at the fixed date. The premium for prompt delivery rose to $1\frac{3}{4}$d. per standard ounce, or 6 per cent.

Ordinary office routine is occasionally brightened by unexpected incidents. Two gentlemen called one summer afternoon, and asked the cost of an option to buy a large amount of silver in three months' time. They were strangers except so far as being introduced by a reputable foreign bank. After paying five hundred pounds in cash, they left without disclosing the purpose for which the transaction was made. As it was never profitable to make use of the option, nothing further was heard from these gentlemen whose appearance was a veritable 'bolt from the blue.'

The handling of silver is always full of interest, and not without adventure. The writer remembers vividly an experience in his youthful days, when four boxes of silver had to be shipped for Hamburg late on Christmas Eve. It was a bitterly cold night, and the van journey to the Thames was chilly. At the wharf a large barge waited to carry the boxes out to the packet waiting in mid-stream. The barge was taken in tow by a small tug. The river was absolutely deserted, and the effect of standing alongside four boxes in a vast expanse of barge, the sides of which were too high to look over, was eerie in the extreme. The barge was made fast to the ship, and the boxes were slung up with considerable difficulty to the deck to an accompaniment of guttural objurgations in the German tongue. Once on board, the cosiness of the cabin and a steaming cup of coffee

were very welcome. When the ladder was descended the tug had left, and the bargee and the writer were alone. The ship, which had been only waiting for the silver, weighed anchor and disappeared amid the twinkling lights. The only way to reach shore was to let the flow of the tide take the lonely passengers to the nearest wharf to which careful steering could bring them. An hour of voyaging, not without moments of excitement, brought the barge alongside a quay near Waterloo Bridge, and the writer, half frozen but elated with the experience, hurried home for Christmas.

Another incident, about the same time, impressed itself upon his memory. A foreigner asked that a sum of money should be handed personally to some one who would lay it out in funeral expenses of a son with whom he had been at variance for many years. The address given was in Soho, and proved to be a fried fish shop kept by the deceased man and his Polish wife, who, utterly ignorant of the English tongue, employed her sister as interpretress. The latter was in the bloom of her youth, about seventeen years old. Her jet black hair, brilliant dark eyes, transparent ivory complexion and fairy form, were by no means easily forgotten. For years afterwards the characteristic pungent odour of fried fish ever recalled the episode. On a table lay one of those articles essentially Continental, a metal wreath encrusted with silver.

One of the first occasions when silver was conveyed through the London streets in a motor-propelled vehicle was during a great railway strike. The strikers little imagined, from the appearance of the vehicle which ran the gauntlet of their pickets outside Paddington Station, that it contained five tons of silver for shipment to the East.

It is not easy to dispose of an ill-gotten silver ingot of the usual market size. Twenty years ago a bar, packed in a stout box, was sent from London to Birmingham. It disappeared in transit, and the insurance value was duly paid to the owner by the underwriters. A few months afterwards some boys amused themselves in an alley in a poor part of Birmingham by turning over and

attempting to throw about a dull dirty mass of metal, which they took to be lead. A passer-by asked them what they were playing with, and the boys sold him the 'lead' for 1s. It turned out to be the larger part of the stolen silver bar, worth £140, which had evidently proved too awkward a morsel for the thief to swallow.

The Great War affected silver to a remarkable degree, as might well have been expected, not only with regard to price and consumption, but also as to transit. Formerly silver used to be consigned to Paris by the evening mail train, and be delivered early next morning at its destination, a simple receipt for the bars being given by the railway company in London. When war broke out, however, it was considered necessary at first for the bars to be accompanied by agents of the senders, and the journey was sometimes eventful. One Thursday the steamer was attacked by two submarines. Gifted with a clean pair of heels, the vessel dodged the enemy vessels and safely reached port. The agent who conveyed the silver watched from the shore French torpedo boats and aeroplanes searching for the enemy submarines, and heard, before he slept, that they had been successful in sinking one of the pirate craft. On the succeeding Monday a further consignment of silver was sent. The agent in charge was on the bridge with the captain. Halfway over, the vessel shook, and a slamming noise was heard, attributed by the stewards, doubtless for the reassurance of passengers, to the sudden closing of an iron door below deck. The captain, however, remarked to his companion, 'We have bumped a submarine,' and reported the fact, probably fatal to the monster of the deep, as soon as he reached shore. Thus by mere accident another submarine met its just doom.

The Channel steamer *Sussex* escaped narrowly a total disaster on March 24, 1916. About a week after the savage attack—which involved the death of many passengers—a bag, bloodstained within and without, was returned by the postal authorities to the senders in London. It contained documents and fragments of silver used for assaying, which accompanied a consignment of

silver which had been sunk beneath the waves. Several Peninsular and Oriental Steam Navigation Company's steamers were sunk by the enemy.

The origin of silver mines is often full of romance. There is a group of celebrated mines producing silver nickel and cobalt ores in South-Eastern France, among the magnificent Alpine masses of the Dauphine. The discovery of these, as of many other notable mines, was purely accidental. In 1767 Marie Payen, a shepherdess of Allemont, happening upon an outcrop of ore, brought away a weighty lump in ignorant curiosity, which she handed to the village smith. The mass was tested on his forge, and molten silver trickled from it. The shepherdess on her wedding day received 600 francs as a reward for the discovery.

A story is recorded of the Chalanches Mines similar to those told of more modern mining districts. The frequent inaccessibility of mines in winter, the value of the ore, and its ready fusibility, made easy systematic robbery by the local inhabitants. All the circumstances worked together to make them the prey of barefaced plunder. With the aid of a common forge-fire, even without the intervention of a crucible, and with little knowledge or skill, lumps of silver could be produced from the very rich chlorides, ruby silver and black sulphides, which constituted in the main the soft earthy ores found in the crevices of the Chalanches outcrop. Aged inhabitants, like old smugglers, still talk sportively of the thefts, and point out nooks in the woods, which are said to have been the scenes of former illicit silver-ore smelting, the ruins still remaining of the little furnaces hollowed out by the miners. From furnaces no larger than an ordinary fireplace dug in the earth and smeared with clay, and by the use of charcoal, or, failing that, clods of dung as fuel, with two or three little urchins to blow like the cherubs on old maps, out trickled the white metal. Clergy and people joined cheerfully in these moonlighting operations without shocking local ethics in the slightest degree. The priest of Allemont, who lately restored the parish church, says that the old church had a room

adjoining the sacristy, in which a former reverend father used to smelt down silver ore brought to him by the faithful. The slags were concealed in an excavation under the floor, where a large accumulation of such refuse was found when the church was restored.

During the earliest period of mining at the Chalanches, some bodies of extremely rich ore were found near the surface. It is said that two lucky finds produced sufficient silver to pay for the two buildings known as the pavilions of Allemont, with their various ornamentations, including the *fleurs de lis* which adorn the roof. As 200 to 300 kilos of silver would be worth at that time from £2000 to £3000, this statement does not seem incredible.

Kaiser Wilhelm II. of Germany, who ennobled Fräulein Krupp, was by no means the first German prince to give a title to a worker in metal. A working miner of Schneeberg, originally known as Armer Cuntz, or poor Conrad, grew wealthy, and was raised to the dignity of Graf Cuntz von Gluck by the Emperor Maximilian (1493-1519). Successful mine-managers have always commanded large salaries, and the profession can secure fine prizes. Xenophon (*Memorabilia*) states that a good overseer at the Athenian Mines was paid a whole talent, worth in modern purchasing power £8000.

Discoveries of mines have usually been the result of accident, in which earthquakes, lightning, and forest fires have frequently had a share. Diodorus Siculus writes: 'These places being covered with woods, it is said that in ancient times these mountains were set on fire by shepherds, and continued burning for many days, and parched the earth so that an abundance of silver ore was melted, and the metal flowed in streams of pure silver like a river.'

The silver-lead mines of Goslar were revealed by a horse which had been tied to a tree by his noble master. The steed had been shod with iron, and by its restive motions uncovered a vein of lead which afterwards became an important mining centre. The hill was named Ramelsberg, after the name of the horse (Ramelus), but

HANGING SABBATH LAMP.

(*p. 144.*)

the name of its noble owner is lost in oblivion. Some years after the discovery, a portion of the mountain slid down and widowed four hundred women in one fell blow.

In 1530 a German miner, poor but skilled in his art, dwelt in the middle of a forest in a solitary hut, and tended his employers' cattle. Whilst digging a little trench in which to store milk, he opened a silver vein. At once he washed some of the ore in a bowl, and detected particles of pure silver at the bottom. He obtained a mining lease, and though successful at first, beggared himself and others in an unsuccessful quest. Ultimately, however, when the original finder had parted with his interest, the mine yielded enormous riches. The mine was named reverently 'God's Gift.'

Agricola, in *De Veteribus et Novis Metallis*, states that the discovery of the silver-mines at Freiberg came about by chance and accident. 'By the river Sala, not unknown to Strabo,' he states, 'is Hala, a place once country, now a large town; the site, at any rate, was famous and renowned for its salt springs even from Roman times, and for its possession the Hermunduri fought with the Chatti. When people carried the salt thence in wagons, as they now do, straight through Meissen (Saxony) into Bohemia—which is lacking in that seasoning to-day no less than formerly—they saw galena in the wheel tracks, which had been uncovered by the torrents. This lead ore, since it was similar to that of Goslar, they put into their carts, and carried to Goslar, for the same carriers were accustomed to carry lead from that city. And since much more silver was smelted from this galena than from that of Goslar, certain miners betook themselves to that part of Meissen in which is now situated Freiberg, a great and wealthy town; and we are told by consistent stories and general report that they grew rich out of the mines.' Agricola places the discovery of the mines at Freiberg at about 1170 A.D.

Agricola has an amusing description in *De Anemantibus* of the gnomes which frequent mines. 'Then there are the gentle kind that the Germans as well as the Greeks call "cobalos," because they mimic men. They

appear to laugh with glee and pretend to do much, but really do nothing. They are called little miners, because of their dwarfish stature, which is about two feet. They are venerable looking, and are clothed like miners in a filleted garment with a leathern apron about their loins. This kind does not often trouble the miners, but they idle about in the shafts and tunnels and really do nothing, although they pretend to be busy in all kinds of labour, sometimes digging ore, and sometimes putting into buckets that which has been dug. Sometimes they throw pebbles at the workmen, but they rarely injure them unless the workmen first ridicule or curse them. They are not very dissimilar to goblins, which occasionally appear to men when they go to or from their day's work, or when they attend their cattle. Because they generally appear benign to men, the Germans call them "guteli." Those called "trulli," which take the form of women as well as men, actually enter the service of some people, especially the Suions. The mining gnomes are especially in the workings where metal has already been found, or where there are hopes of discovering it, because of which they do not discourage the miners, but, on the contrary, stimulate them and cause them to labour more vigorously.'

Few operations connected with mining excel in interest a recent enterprise undertaken in the Cobalt district of Ontario. The Carson lode, of the Crown Reserve Silver Mine, dipped beneath the surface of a lake. It was mined for some distance under the lake, until its proximity to the surface became a source of danger to the miners. The authorities decided that if the ore could not be removed from under the lake, the lake should be removed from over the ore. The assistance of the resources of modern science was called in, and powerful pumps were installed, by means of which the vast body of water in the lake—forty-five acres in area—was transferred to a distance, and a new lake created. The bed was found to be a mass of mud, so fresh pumps were employed to reintroduce water to wash it clean. Thus water was pumped out, and pumped in, actually at the same time. A boat is now permanently anchored

in a small sump in the middle of the space. It was not considered wise to remove all the clay at the bottom of the lake, as it would have entailed a large expense not justified by the prospects. The property is now in such a condition that it can be prospected from below without danger, and the ore extracted. The total mud and water removed to date is about seven hundred million gallons, and the present sump is over one hundred feet below the original level of the lake. On the whole, while the new area opened up by the drainage of the lake has not proved as prolific in veins as was hoped, the result of the project may be considered very satisfactory. The pumping out of the lake made it possible to win known ore on the Crown Reserve property containing over two and a half million ounces of silver, which otherwise could not have been extracted, and the discovery of small veins, as a result of the pumping of the lake, although not in themselves of great importance, is sufficient to pay for the whole cost of the operation.

Treasures of precious metal are believed to have been stored beneath the soil in India in vast quantities. In the course of the great cataclysms which have upturned dynasties in that great country, the hiding-places of many of these caches have been forgotten. Many princes have a family hoard, the locality of which is told in secrecy to each succeeding head of the house, and known to but two or three men beside. One Maharajah of modern upbringing and tastes decided to realise the ancestral treasure. From a subterranean chamber within his ancient stronghold the mass of silver coin was removed with the aid of spades, and revealed, when counted, the absolute honesty of the custodians, for the expected two hundred lacs of rupees (twenty million) proved to be only three pieces short. The proceeds were invested in an important railway, now practically owned by the Maharajah in question.

CHAPTER XIV

MINTS

Derivation—Hand striking—Early British mints—The Tower Mint—Pepys' visit—Specimens for his collection—Chamberlain's description—List of officials—Method of striking—Visit to Royal Mint of to-day—Melting-house—Manipulation of fiery crucibles—Rolling and annealing—Making blanks—Blanching—Value of electricity—Press room—Money making—Steel fingers—Weighing and treating coins—Output—Precautions against loss—First Colonial mint—Functions of mint-master—Quaint oath—Charles II. and the tree—Buccaneers—First U.S. mint—Quantity of U.S. coin minted—U.S. Mint reports—Coinage of nations in 1914—Silver money in existence—Silver standard countries.

THE origin of the word 'Mint,' as applied to the building in which coins are manufactured, is ascribed to the fact that silver coins were made 2200 years ago at the temple of Juno Moneta in Rome. This goddess was supposed to extend her protection to minting, and her name was applied to coin, hereafter styled 'money,' and also the place where it is struck is since called a 'Mint.' Her name is derived from 'moneo,' I warn. Whether the advice is for the coiner to be accurate, the forger to beware, or the holder to be discreet in use of the coin, no one can question the wisdom of her utterance.

The impress which transformed a mere lump or ingot of metal into a coin originally was effected entirely by hand. The metal, probably white-hot, was placed against a die and struck with a hammer. The process was subsequently modified and the ingot placed between two dies. The upper die was then struck repeatedly until a clear imprint was secured on either side of the coin.

The striking by hand was a slow and tedious process, and rendered necessary the provision of a number of

CUTTING BLANKS, ROYAL MINT. (*p. 148.*)

mints in those centres where currency was in keen demand. Before the time of Athelstan, the archbishops and some of the bishops and abbots in England possessed the privilege of minting money—probably because the clergy alone had the requisite scientific knowledge arising from their educational advantages. Athelstan authorised a number of mints to be set up in the principal towns. Eight were provided in London, seven in Canterbury, six in Winchester, three in Rochester, two each in Shaftesbury, Exeter, Lewes, and Werham, as well as single ones in lesser centres of trade. The way in which the honour was divided throws an interesting light upon the relative importance of these cities in those days.

The use of machinery has long since superseded the simple methods of coining used by our forefathers, but it is still the custom of the Royal Mint to issue, fitted in plush cases, sets of current coin described as handstruck. which by their accurate outline and clear surface, free from flaws, suggest medals rather than current coin of the realm.

The Tower of London used to contain the chief mint of the kingdom. The antiquity of the site for such a purpose appears to date back to the Roman occupation, for it is recorded in the *Victoria History of London* that a silver ingot, inscribed as 'from the workshop of Honorius,' was discovered close to unworn coins of that Emperor within the Tower precincts.

As might have been expected of his lively personality, Pepys viewed the Mint of his day, and very entertaining is the account set down in his *Diary*: ' . . . with Sir John Minnes to the Tower, and by Mr. Slingsby and Mr. Howard, Comptroller of the Mint, we were shown the method of making this new money. That being done, the Comptroller would have us dine with him and his company, the King giving them a dinner every day. And every merry and good discourse upon the business we have been upon, and after dinner went to the Assay Office, and there saw the manner of assaying of gold and silver and how silver melted down (upon) just being put into aqua-fortis, the silver turning into water, and the gold

lying whole, in the very form it was put in, mixed of gold and silver, which is a miracle; and to see no silver at all, but turned into water which they can bring again into itself out of the water : and at table they told us of two cheats, the best I ever heard. One of a labourer discovered to convey away bits of silver cut out for pence by swallowing them, and so they could not find him out, though, of course, they searched all the labourers ; but having reason to doubt him, they did, by threats and promises, get him to confess, and did find £7 of it in his house at one time. The other of one that got a way of coyning as good and passable, and large as the true money is, and yet saved fifty per cent. to himself, which was by getting moulds made to stamp groats like old groats which is done so well, and I did beg two of them, which I keep for rarities. He was neither hanged nor burned ; the cheat was thought so ingenious, and being the first time they could ever trap him in it, and so little hurt to any man in it, the money being as good as commonly goes.' (An excellent comment this !)

Chamberlain, in his work entitled the *History and Survey of London*, gives the following list of the officials of the Royal Mint in 1770, and describes their duties and the manner of coining at that time. The arrangements of to-day, though upon a greater scale, and better equipped by science and machinery, still show a close resemblance. The following account is from his pen.

'The Mint is the office for coining gold, silver, and copper, and is conducted by a number of officers, whose titles and employments are as follows :

'1. *The Warden.*—The business of the warden is to receive the silver, etc., from the goldsmiths, to pay for it, and to superintend all the other persons belonging to the office.

'2. *The Master-Worker.*—He receives the silver, etc., from the warden, orders it to be melted delivers it to the moniers, and receives it back from them.

3. *The Comptroller.*—It is this person's business to see that the money is made to a just assize, to overlook the

officers, and to control them, if the money does not prove as it ought.

'4. *The Master of the Assay.*—His business is to weigh the bullion, and take care that it be according to the standard.

'5. *The Auditor.*—This gentleman inspects and settles the accompts.

'6. *The Surveyor of the Melting.*—His employment is to see the bullion cast out, and that the metal is not altered after the assay-master has made trial of it, and it is delivered to the melter.

'7. *The Clerk of the Irons.*—His business is to take care that the working irons are kept clean, and fit for use.

'8. *The Engraver.*—This person is employed in engraving the stamps for the money.

'9. *The Melters.*—Their business is to melt the bullion before it comes to be coined.

'10. *The Blanchers.*—These persons anneal, boil, and cleanse the money.

'11. *The Provost.*—This person provides for all the moniers, and superintends them.

'12. *The Moniers.*—Their business is to shear the money, and forge it; some beat it broad, others round it, and some stamp or coin it.

'The only part of the process respecting the coining of money which we are permitted to see, is the stamping it, which is performed in a very expeditious manner, by means of an engine worked sometimes by three and sometimes by four men.

'The manner of stamping gold and halfpence is exactly the same, only a little more care is necessary in one than the other, in order to prevent waste. The engine works by a spindle, like that of a printing press, to the point of which the head of the die is fixed with a screw, and in a little sort of a cup which receives it, is placed the reverse: between these the piece of metal, already cut round to the size, and, if gold, exactly weighed, is placed;

with a jerk, is compleatly stamped. It is amazing to see how dexterously the coiner performs this, for as fast as the men that work the engine turn the spindle, so fast does he supply it with metal, putting in the unstamped piece with his forefinger and thumb, and twitching out the stamp with his middle finger. The silver and gold thus stampt are afterwards milled round the edges, the manner of performing which is kept a profound secret, and therefore our readers cannot expect a description of it.'

In the year 1810 the institution was moved into premises close by upon Tower Hill, where it has been housed ever since. This exodus was accompanied by a transition from the use of hand to steam power.

Although the admission of visitors to the Royal Mint had been suspended during the Great War, an exception, by the kindness of the Deputy Master, was made for the purpose of this book, and an inspection of the arrangements for the coinage of silver took place under the courteous guidance of Sir Thomas K. Rose, the Assayer. The workshops were visited in the following order: the Silver Melting-House, the Rolling, Cutting, Press, and Weighing Rooms.

The melting-house is exceptionally spacious and imposing. A range of gas furnaces, heated to 2300 degrees Fahr., fill the ears with a deafening roar. Above them is a travelling carriage, fitted with clutches by means of which huge crucibles containing 5500 ounces, or a sixth of a ton of silver each, are raised from the furnace hole beneath. When the great white-hot vessel, filled with molten metal, is raised ten feet or so above the floor, it presents an awesome sight. Rapidly crimsoning as it cools, it is swung overhead to a mechanical device, in which it is held in a grip, and forced to disgorge its contents in a steady liquid stream. Before it is poured a workman performs the necessary task of stirring the spluttering and fiery brew with an iron rod, which grows red-hot in the act. The metal is run into a series of moulds, linked together in such a way that the cooled ingots can be released by one action of a screw.

The ingots, fashioned like rods about two feet long, three inches wide, and a half-inch thick, are conveyed to the rolling-room, and passed through a succession of rollers until the desired thickness is attained, which, of course, varies with the coins that are to be formed. The continual rolling under great pressure renders the metal too hard for easy working, and annealing becomes necessary. The rods, now thin bands—not unlike sword blades of uniform width—are placed in a tank of water, and carried steadily by means of a metal-riveted chain, moving with exceeding slowness, through a furnace and out into another tank of water on the farther side. The transit through water is for the purpose of excluding the air and thus preventing discoloration by oxidation. When it is considered that the band has been sufficiently rolled, its thinness is tested in two ways, by means of a metal gauge, and also by cutting out a blank, the size of the intended coin, and weighing it.

In the cutting-room the bands are passed through machines, which, at each downstroke, eject two blanks. By means of another machine a ridge is raised around the rim, in order to afford a better foundation for the impression of the die. The blanks are then annealed in a revolving furnace, not unlike a cannon in appearance, through which they are caused to travel from one end to the other by the rifling of the interior. The blanks are next washed in heated acid, which removes any trace of oxidation, and also the surface admixture of copper alloy, leaving the outside practically pure silver. The blanks are dried amidst beechwood sawdust in revolving drums, and separated from the sawdust in an openwork cradle violently shaken by machinery.

It may be mentioned here that the principle of the processes throughout is practically the same as practised in past centuries, but what was done then by hand is now performed by machines, the delicacy and accuracy of which is remarkable. The motive power at the Royal Mint is electricity, manufactured by dynamos installed within the building. The three great engines

and beautifully arranged switchboards show by their well-kept appearance that their custody is a labour of love to the officials concerned.

Perhaps the most fascinating sight of all is the press-room. This is only to be expected, for what pursuit attracts mankind more than that of making money? And how easy the matter seems! You feed white blanks into the machine, and, Hey presto! out they come tumbling in quick succession, as sparkling threepenny bits or brand new shillings. You can see the mechanism itself by bending down and looking beneath the die. A long steel finger slides out, catches hold of the bottom blank in the feeding shoot with one of its joints, pushes it over the steel bed to a circular hold, into which it drops. Down comes the die with a thud, and another joint of the same steel finger sweeps the now impressed coin to another shoot, whence it falls into a receptacle beneath. When fingers of flesh had to do the moving, as in days of old, it must have been a risky business for the operator. The milling, of those coins requiring it, is performed at the same time as the impression. The blank is forced by the pressure of the die into a collar, serrated for the purpose.

It was somewhat of a relief to enter the silence of the weighing-room, where a multitude of machines, driven by bands from the ceiling, select the coins of correct weight, and refuse those too heavy or too light. The coins are fed through a shoot into the machine, and deposited in succession upon a minute scale. After pausing a moment whilst the weight is taken, they drop into one of the three slots beneath, the centre one if suitable for issue, or into one on either side if rejected. An occasional refill of fresh coin is the only manual labour required by these instruments, which seem almost to possess intelligence of their own as they quietly test the coins at the rate of twenty-two a minute.

Seated at a bench whereon a leather band revolves, somewhat like a modern railway escalator, several workmen pick out discoloured or blemished coins. The band is ingeniously adjusted, so as to reverse the coins and

bring each side in succession to view without touching the coins by hand. A tranquil task for a hot July afternoon!

The output of the Royal Mint depends upon the size of the coins in course of manufacture. The smaller the coin, the less is the total value of the turnover. The Mint has struck between five and a half and six million coins in a week, and as much as £350,000 in sterling silver coin in the same short period. The Great War imposed a heavy strain upon its powers of mintage, for during the first two years no less than £15,000,000 of silver coin was issued, by means of which not Great Britain alone was supplied, but also outlying portions of the Empire, such as Fiji and the Falkland Islands.

The fact that the Royal Mint is a Government institution, and the valuable material there manufactured is public property, renders great care necessary lest any of the precious metal become missing. At the commencement of each day a certain amount of bullion, carefully weighed and checked, is issued for manufacture, and before the workmen leave the premises at the close of day, the material coined or uncoined is again weighed and checked. If there be a deficit, the work-rooms have to be swept and searched until the shortage is recovered.

Some account of the first American, then a British Colonial, mint may here be inserted. Somewhere about the year 1652 the first mint ever set up in North America was established in Boston, for coining small pieces of silver of a fixed weight and value. The matter had become urgent owing to the debased and clipped condition of the money in the colony. The Civil War, which culminated in the execution of Charles I., led to a great scarcity of currency in England itself during the struggle, and it was only to be expected that British dependencies should be in a similar plight. The mint-master was allowed a seigniorage of 1s. 6d. out of every 20s. which he coined. The mint was of modest dimensions, about 16 feet square and 10 feet high, and the two officials were bound by an oath of most imposing solemnity to

diligently perform their duties. During the thirty-four years that this embryo mint performed its functions, the value of the coins turned out exceeded five million dollars, the seigniorage on which proved, as may be conceived, highly profitable to those in charge.

Nathaniel Hawthorne narrates in his tale entitled *Grandfather's Chair*, that Captain Hill, one of the mint-masters, gave to his future son-in-law the weight in silver shillings of his fair bride as dowry. Let us hope her fond bridegroom found her afterwards worth her weight in gold!

The awe-inspiring oath to be taken by the mint-masters was as follows:

'Whereas yo^{w}, John Hull and Robert Saunderson are appointed by the order of the Generall Courte bearing date the 10th of June 1652, to be officers for the Massachusetts Jurisdiccon in New England for the melting, Refining and Cojning of silver yow doe heere sweare by the great name of the ever living God that yo^{w} will faithfully and dilligently pforme the duty of you^{r} places that all mony cojned by yow shall be of the Just Allay of ye English Cojne that every shilling shall be of due weight, viz. three penny troj weight and all other peeces proportionably, according to the order of the Courte so neere as yo^{w} Cann—So helpe yo^{w} God.'

A booklet issued by the First National Bank of Boston contains further interesting details:

'The "tree" required by the order for a new die was at first a willow (the kind of tree not being specified in the order); but so crudely executed and so generally unsatisfactory were the coins, that shortly they were discontinued and another tree-bearing piece substituted. This tree was called the oak, and, as it turned out, was so named to good purpose.'

Upon the return of Sir Thomas Temple, who fled to New England for refuge during the Cromwell administration, Charles plied him with questions regarding affairs in the New World.

STRIKING COIN, ROYAL MINT. (*p. 156.*)

'"What is the meaning of this device?" he asked of Sir Thomas, who had handed him an oak shilling. "That is an oak adopted as an emblem of loyalty, inasmuch as your Majesty's life was once saved by that kind of tree," said Temple, who was friendly to the Colonists.

'This diplomatic reference to the episode of Boscobel, in which Charles escaped his enemies by hiding among the branches of an oak, turned the king's suspicions aside temporarily, and no doubt had a restraining effect on his policy toward the Colony for a time.

'Five million dollars is estimated to be the value of the silver coined at this mint during its service of thirty-four years, and the 5% seigniorage divided between the two men must have been a tidy sum in those days.

'The buccaneers preying in West Indian waters contributed the larger part of the bullion deposited for coinage, and they demanded immediate shipment of the equivalent coin, contributing nothing to the Colony but the seigniorage paid the mint.

'Flatt and square was the shape first ordered for the new money, but later this was changed to "round forme" while the denominations were fixed at "12d., 6d., and 3d. peeces," to be stamped on one side with the figure denoting value and on the other with the initials N.E.

'By the original draft of the law, the mint-master was allowed as recompense, "one shilling and sixpence out of every twenty shillings which he shall stamp as aforesaid."'

The original mint of the United States of America was established at Philadelphia in 1792, when that city was the seat of the National Government. Until the year 1836, coins were struck by hand or horse-power, but from that year until quite recently steam was the motive force. At the present time the all-conquering agency of electricity is brought into play.

The two following tables are taken from the Report by the Director of the U.S. Mint:

Coinage of Nations.

Country.	Monetary Unit.	Calendar Year, 1914.			
		Gold.		Silver.	
		Unit Value of Countries' Money.	Value of United States Money.	Unit Value of Countries' Money.	Fine Ounces Consumed.
United States	Dollar.	53,457,818	$53,457,818	6,083,823	4,400,885
Philippine Islands	Peso.	..	..	277,000	133,579
Abyssinia	Piastre.	..	..	..	..
Austria-Hungary	Crown.	..	..	..	..
Belgium	Franc.	..	..	..	..
Brazil	Milreis.	49,290	26,929	16,395,000	4,333,123
British Empire:					
Australasia	Pound.	3,947,029	19,208,217	..	..
British East Africa and Uganda	Rupee.	..	..	..	..
British West Africa	Pound.	..	..	..	..
Canada	do. / Dollar.	1,572,042	1,572,042	843,244	585,000
Ceylon	Rupee.	..	..	400,000	119,978
Great Britain	Pound.	..	..	..	..
Guiana, British	do.	..	..	..	..
Cyprus	do.	..	..	..	..
Hong-Kong	do.	..	..	..	..
India	Rupee.	..	..	54,281,037	18,659,106
Sarawak	Dollar.	..	..	..	..
Straits Settlements	do.	..	..	38,360	20,094
Other British Dependencies	Pound.	..	..	..	..
Bulgaria	Leva.	..	..	..	..
Chile	Peso.	..	..	..	..
China	Tael, 1913. / Dollar, 1914.	..	..	104,040,301	78,624,167
Colombia	Dollar.	84,523	84,523	1,280,000	737,821
Costa Rica	Colon.	..	..	141,467	81,867
Denmark	Kronor.	18,041,800	4,931,314	391,029	72,937
Dutch East Indies	Florin.	..	..	3,460,000	1,051,209

Ecuador	Sucre.	..	..	500,000	401,875
Egypt	Pound	..	..	..	..
Ethiopia	Talari.	..	..	..	..
Finland	Markka.	..	..	..	..
France	Franc.	..	..	..	..
French Colonies					
Indo-China	Piastre.	..	..	..	..
Tunis	Franc.	..	..	..	..
Germany	Mark.	77,547,000	18,456,186	67,271,568	10,813,905
German East Africa	Rupee.	..	..	600,000	206,250
Honduras	Peso.	..	..	..	..
Italy	Lira.	..	..	20,704,950	2,779,148
Italian Somaliland	Rupee.	..	..	300,000	103,123
Japan	Yen.	..	..	..	..
Liechtenstein	Crown.	..	..	..	..
Mexico	Peso.	..	..	..	..
Morocco	Rials.	..	..	13,598,640	9,790,130
Netherlands	Florin.	8,790,152	3,532,760	18,085,000	5,494,539
Nicaragua	Cordova.	..	..	47,000	3,826
Norway	Crown.	..	..	..	..
Persia	Kram.	537,526	92,454	27,656,220	3,683,460
Peru	Libra.	123,812	602,531	73,943	527,654
Portugal	Escudo.	..	..	..	..
Roumania	Leu.	..	..	5,926,935	795,550
Russia	Rouble.	..	..	..	..
Salvador	Peso.	..	..	2,700,028	1,921,794
Servia	Dinar.	..	..	15,000,000	2,013,394
Siam	Tical.	..	..	488,128	211,839
Sweden	Crown.	..	..	..	..
Switzerland	Franc.	16,000,000	3,088,000	7,200,000	966,438
Turkey	Piastre.	..	..	..	..
Venezuela	Bolivar.	..	..	..	..
Totals		..	$105,052,774	..	148,532,691
Recoinage		..	1,749,891	..	10,505,801
New Coinage		..	$103,302,883	..	138,026,890

Monetary Systems and Approximate Stock of Money in the Aggregate and per Capita in the Principal Countries of the World, December 31, 1913.

	Country.	Monetary standard.	Monetary Unit.	Stock of Gold.			Stock of Silver.			Uncovered paper.	Population.	Per Capita.			
				In banks and public treasuries.	In circulation.	Total.	Full tender.	Limited tender.	Total.			Gold.	Silver.	Paper.	Total.
				Thousands. $	*Thousands.* $	*Thousands.* $	*Thousands.* $	*Thousands.* $	*Thousands.* $	*Thousands.* $	*Thousands.*	$	$	$	$
1	United States	Gold.	Dollar.	1,524,100	380,600	1,904,700	568,300	179,500	747,800	803,500	98,200	19.39	7.61	8.18	35.18
2	Austria-Hungary.	do.	Crown.	252,200	44,100	296,300	Nil.	124,800	124,800	202,300	49,900	5.53	2.50	4.05	12.08
3	Belgium	do.	Franc.	48,500	20,000	68,500	Nil.	10,800	10,800	147,100	7,500	9.00	1.44	1.96	12.40
	British Empire:														
4	Australia	do.	Pound sterling.	193,100	23,400	[1]216,500	Nil.	10,000	10,000	...	4,800	45.10	2.08	...	47.18
5	Canada	do.	Dollar.	[2]141,300	1,200	142,500	Nil.	131,200	131,200	98,300	7,200	19.79	18.22	13.65	51.66
6	United Kingdom	do.	Pound sterling.	[3]494,300	335,800	830,100	Nil.	126,500	126,500	116,500	45,400	18.28	2.78	2.56	23.62
7	India	do.	Pound sterling and rupee.	[4]124,000	250,000	374,000	[4]850,000	45,000	895,000	45,400	244,300	1.53	3.99	.18	5.70
8	South Africa	do.	Pound sterling.	15,000	...	15,000	Nil.	2,700	2,700	9,000	6,000	2.50	.45	1.50	4.45
9	Straits Settlements[5]	do.	Dollar.	1,200	...	1,200	Nil.	7,000	7,000	18,100	2,000	.60	3.50	9.05	13.15
10	Chosen (Korea)	do.	Yen.	1,700	...	1,700	Nil.	3,400	3,400	11,100	13,500	.13	.24	.82	1.19
11	Denmark	do.	Crown.	40,500	...	40,500	Nil.	7,500	7,500	...	2,800	14.46	2.67	...	17.13
12	Egypt	do.	Piastre.	10,100	181,200	[6]191,300	Nil.	18,100	18,100	6,700	11,300	16.92	1.60	.59	18.11
13	France	do.	Franc.	682,800	517,200	[7]1,200,000	347,400	63,700	411,100	325,800	39,600	30.03	10.38	8.22	48.63
14	Germany[8]	do.	Mark.	284,700	631,000	915,700	Nil.	64,600	64,600	274,700	65,000	14.08	.99	4.22	19.29
15	Greece	do.	Drachme.	31,800	...	31,800	Nii.	...	...	18,300	3,000	16.00	...	6.10	22.10
16	Haiti	do.	Gourde.	400	1,500	1,900	Nil.	...	...	7,600	2,000	.95	...	2.80	3.75
17	Italy	do.	Lira.	265,500	...	265,500	22,400	...	22,400	211,500	35,000	7.58	.64	.60	8.82
18	Netherlands	do.	Florin.	60,900	...	60,900	Nil.	28,200	28,200	61,200	6,000	1.01	4.70	1.02	6.73
19	Norway	do.	Crown.	19,900	6,100	26,000	Nil.	4,100	4,100	9,000	2,400	10.83	1.29	3.75	15.87
20	Roumania	do.	Leï.	40,100	2,100	42,200	Nil.	15,100	15,100	84,400	7,300	5.78	2.06	1.15	8.99
21	Russia	do.	Rouble.	733,400	278,100	1,011,500	Nil.	78,800	78,800	...	163,900	6.17	.48	...	6.65

22	Servia	do.	Dinar.	12,000	...	12,000	Nil.	800	800	7,100	2,900	4.13	.27	2.44	6.84
23	Siam	do.	Tical.	100	...	100	44,500	...	44,500	3,000	8,100	.01	5.49	.37	5.87
	South American States:														
24	Argentina	do.	Peso.	292,600	...	292,600	Nil.	...	...	575,900	7,200	4.65	...	79.98	84.63
25	Bolivia	do.	Boliviano.	8,000	...	8,000	Nil.	...	...	12,000	2,300	3.47	...	5.21	8.68
26	Brazil	do.	Milreis.	90,100	...	90,100	Nil.	...	...	400,000	23,100	3.90	...	1.73	5.63
27	Ecuador	do.	Sucre.	2,900	1,900	4,800	Nil.	1,400	1,400	1,900	1,500	3.20	.93	1.26	5.39
28	Guiana, British	do.	Pound sterling.	100	800	900	Nil.	1,000	1,000	...	300	3.00	3.33	...	6.33
29	Guiana, Dutch	do.	Florin.	100	...	100	Nil.	200	200	200	100	1.00	2.00	2.00	5.00
30	Paraguay	do.	Peso.	1,700	...	1,700	Nil.	...	...	350	800	2.12	...	.48	2.60
31	Peru	do.	Sol.	5,400	14,600	20,000	Nil.	2,400	2,400	...	4,500	4.44	.53	...	4.97
32	Uruguay	do.	Peso.	14,800	...	14,800	Nil.	...	...	7,500	1,200	12.33	...	6.25	18.58
33	Venezuela	do.	Bolivar.	1,800	...	1,800	Nil.	900	900	600	2,700	6.66	3.33	.22	10.21
34	Spain	do.	Peseta.	92,500	...	92,500	138,300	96,500	234,800	113,300	19,600	4.71	11.97	5.67	22.35
35	Sweden	do.	Crown.	27,500	...	27,500	Nil.	1,500	1,500	26,000	5,600	4.91	.26	4.64	9.81
36	Switzerland	do.	Franc.	32,800	...	32,800	Nil.	4,000	4,000	28,800	3,700	8.86	1.08	7.77	17.71
	Central American states:														
37	Nicaragua	Silver	Peso.	...	...	...	100	...	100	...	600	...	.16	...	.16
38	Salvador	do.	do.	2,000	...	2,000	2,300	...	2,300	4,500	1,200	1.66	1.91	3.75	7.32
	TOTALS			5,549,900	2,689,600	8,239,500	1,973,300	1,029,700	3,003,000	3,631,650	902,500	...	...	...	...

[1] Includes gold, silver and other coin.

[2] 'Specie' includes subsidiary coin in banks.

[3] Estimates for the United Kingdom prior to 1910 were for coin only; these figures include $100,000,000 for bullion in banks.

[4] Based on estimate of active rupee circulation by Accountant General of India in 1908.

[5] Includes Straits Settlements, Malay States and Johore.

[6] Based upon a calculation by Messrs. P. Arminjon and B. Michel in 1908, who then estimated the stock of gold at 33,000,000 to 41,000,000 Egyptian pounds. The mean of these figures was adopted. Since then the net imports of Egypt, by customs records, have been $50,000,000, but the 1908 estimate has been changed only to the extent of the increase in bank holdings. It does not seem probable that Egypt can have absorbed the amount of gold indicated by the customs records.

[7] Estimate of A. De Foville, 1909. Silver for 1912 repeated for 1913.

[8] The figures for the stock of gold in Germany are based upon an estimate, by Dr. Arnold, a director of the Reichsbank, of 3,000,000,000 marks in German coin in the country at the end of 1910. At the close of 1913 the Reichsbank held $114,873,000 in bullion and foreign coin.

NOTE.—The blank spaces in this table signify that no satisfactory information is available. The data shown above has been gathered from various reliable sources, is by no means complete or satisfactory, but is the best obtainable at this time. In some instances the amount of gold in banks and public treasuries is carried out as the total stock in one country, although an unknown amount is in circulation. The case of Italy is an example of this. The per capita circulation is based upon known amounts only. All estimates for stock of money in circulation must be accepted with reserve.

Although many countries are described as possessing a gold standard, a large proportion make no use of gold for internal currency, owing either to their preference for currency in another form, or because of insufficient financial standing. The mintage of silver coins—so long as the price of the metal is low enough to render the intrinsic less than the nominal value—provides a profit to the State, and justifiably can be encouraged provided external debts of the country can be discharged upon a gold basis without a loss. Several of the South American States have created a gold fund called the Caisse de Conversion by means of which the exchange with other countries can be regulated officially, but it should be noted that silver minting on an unduly large scale possesses elements of danger, though not to the same degree as an undue creation of paper currency, and for that reason a self-respecting state guards jealously the proportionment of that part of its currency, the nominal value of which exceeds its intrinsic value, to the trade requirements of its people. Otherwise the operations of trade are retarded, the level of price is affected, and the industry of the people not fairly remunerated.

The only countries which do not possess a gold standard and base their currency systems upon silver alone are China proper, French Indo-China, Hong-Kong, Abyssinia, Afghanistan, Persia, Salvador, and Honduras.

In the Appendix will be found the estimated stock of money in the world at the end of the calendar year 1918, and also the coinage of the nations in the years 1915 and 1917 respectively.

ARRIVAL AT EUSTON STATION. (*p. 163.*)

CHAPTER XV

THE LONDON SILVER MARKET.

Waywardness of price—Main influences—Charm of silver—Diversity of orders—Orient chief consumer—Why London is principal market—Component firms—'Fixing' the price—Varying volume of business—Cash and forward delivery—Squeezes in delivery—Speculation—Brokers' charges—Options—Packing for transit—The Stock—Accuracy of London assay—Quality of refined bars—Standard—Exports from London to the East—The history of the market for about one hundred years.

No treatise upon silver can be really comprehensive unless it embraces a description of the London silver market, the business centre from which silver is distributed to the furthermost portions of the globe.

Of all the world's markets that of silver may be considered the most interesting. The price of this commodity fluctuates with remarkable frequency, and the movements vacillate with a peculiar waywardness, which often defeats the prognostications of operators, however skilled they may happen to be. These fluctuations arise from causes which originate from almost every country of consequence. Rain, drought, strikes, shipwrecks or wars may either raise or depress the price, just according to the locality affected or the special circumstances of the case. Good harvests, the discoveries of new minefields, cheaper processes of refining, easier methods of transit, all leave their mark upon the price. The possession or the want of silver makes or mars the prosperity of nations, and touches the very comfort of daily life.

The principal reason for the sensitive character of the silver market is that silver performs a function as

currency which brings it into intimate relation with the prosperity or otherwise of the greater part of the world's population. The bulk of daily transactions are effected by the exchange of pieces of silver—mostly in a coined form. The necessity of keeping up the supply, and bringing the metal from the Americas, where it is mainly found, to the East, where it is principally used, exposes supplies to risk from shipwreck, and interruption from war and strikes, occurrences that have often substantially moved the price. The evolution of metal currency from copper, bronze, and silver, practically upon an independent footing, to gold and silver at a fixed ratio, was followed by the use of gold with silver as subsidiary. This scheme was not adopted at once by all, but by different nations at different periods; thus necessitating frequent radical changes in the value of silver as measured in other commodities. Nor is the end yet. The advisability of preventing wide fluctuations in the value of the essentials of life, such as food, rent, etc., may result some day in a device by which the supply of the world's money shall not depend upon the output of any so-called precious metal or metals, but upon a more economic foundation. One thing remains certain, the charm and utility of silver are so manifest that the silver market will continue to flourish whatever new circumstances may arise.

The letters and cables which reach the bullion broker from day to day never stale from lack of variety. Communications from hitherto unknown correspondents, from the most out of the way quarters, and with the most startling requests, swell the mail-bag and filter through the cables. A decision may be called for at a few minutes' notice as to the best route to send silver to Turkestan, the cost of transit, including insurance, and the method of packing, whilst a little later a request may arrive as to the value of Maria Theresia dollars from Aden—after deduction of the cost of refining. At one moment a foreign government may seek information preparatory to a purchase of a million or so ounces; at another, a native jeweller from some town in the interior

of Africa may send a money order to purchase fifty ounces for the manufacture of his wares.

There are many reasons why London should control the disposal of the world's output.

The volume of trade between China and the United Kingdom and the Dominions which owe allegiance to the British Crown far exceeds the business relations of that great congeries of states, called provinces, with any other western nation. The purchases or sales of silver which serve to adjust exchange between China and nations whose currency system is based upon gold, are practically all made in London, where nearly all the great Anglo-Eastern banks, which finance the trade of China and of India, have their head offices. The great proportion of the world's output that finds its ultimate home in India has been already indicated.

The fact that London is the financial centre of the world is not without influence upon the matter, for the funds to purchase silver are often furnished by loans obtained in London, or are derived from the proceeds of goods, shipped perhaps to foreign countries, but for which payment has been arranged to be made in London. Finally, the mail steamers which radiate from Great Britain form, as a rule, the swiftest and cheapest route to the principal consumers of silver—governmental or otherwise.

In the days of bimetallism, when silver and gold were at a steady ratio of about 15 to 1, it was almost immaterial which metal acted as the means of discharging international indebtedness, and London became, as a matter of course, the chief market for silver, and will remain so as long as it continues to be the financial clearing-house of the world's trade.

The care taken to safeguard the reputation of the London silver market, the high standing of the firms that comprise it, and the confidence built up by the methods and practices adopted to protect the interests of buyer and seller alike, provide a strong guarantee that in the future as well as in the past, silver will find its business centre in London.

For several generations four firms have formed the market, namely, Messrs. Mocatta and Goldsmid, Samuel Montagu and Co., Pixley and Abell, and Sharps and Wilkins. The first-mentioned firm dates back to 1684, ten years before the Bank of England was founded. In the case of the second firm silver forms but one branch of their business, for, when silver and gold were equally good international remittances, bullion operations formed an integral part of foreign banking.

The operation in London commonly called 'fixing' the price of silver, controls the price of the metal in every important financial centre throughout the world. This official quotation is cabled abroad instantly by the agency of the Press as well as by each of the four firms, to such of their foreign clients as desire the information. The great bulk of the business transacted is based upon this price, which is determined at a certain hour each day, namely 1.45 P.M. (Saturday, 11.45 A.M.), by the partners of the respective firms, who meet at the office of one of their number.

Before the demonetisation of silver by Germany, and the great fall in price which followed that event, the fluctuations as well as the volume of business transacted each day were so small that the operation of 'fixing' was carried out by an informal change of notes or by verbal messages.

Each broker, whilst he may disclose the excess of his own position as a buyer or a seller at a given price, is careful to protect in every possible way the interests of his clients, and to preserve their anonymity. It should be remembered that it is quite possible for the business done in the market upon a given day to be extremely large, and yet the amount changing hands at 'fixing' to be trifling. Clients are therefore well advised to give a discretion to brokers as to the quantity of silver in which it is desirable to operate for their account upon any one day.

It may be taken for granted that, as a general rule, no silver is parted with at any price before the official quota-

tion is made, but after 'fixing' it may occasionally change hands at a lower price if the market is weak, or at a higher if buyers appear after supplies have been absorbed.

The method of fixing the price is very simple. The first step is usually to ascertain if there is occasion to alter the price of the day before. If supplies prove insufficient to satisfy buying orders, higher prices are suggested until the offerings balance the demand. Should offerings at the preceding day's price exceed the amount of buying orders, the price is lowered until equipoise is obtained. Usually a number of orders at different limits have been left in hand by clients, to buy or sell; with the assistance of these orders the price can be adjusted to a nicety. By this method of fixing the quotation the scale is evenly held between the buyer and the seller for whom the brokers act.

As a rule, two prices are agreed upon at 'fixing,' one for a cash delivery, which implies delivery within seven days—at the option of the seller—and the other for delivery in two months' time, that is to say, exactly after two calendar months' interval. A period of two months is selected because it is found the most convenient interval at which smelters can undertake to deliver the silver which they have purchased in the form of ore.

These two periods of delivery—cash and two months—are obligatory as between brokers, but brokers can, as a rule, make arrangements with their clients so as to suit the latter's convenience with regard to shipping, etc. It should be remembered, however, that any request on the part of a client for arrangements differing widely from brokers' rules as between themselves, may involve expense to the broker in loss of interest, etc., and also some risk of failure to keep engagements which he has contracted with another broker in order to execute his client's business.

After 30th July 1914 (just preceding the declaration of war by Great Britain against Germany) the official quotation for forward delivery was temporarily

discontinued, the necessity of restricting credit during this critical period rendering the step advisable.

The difference, if any, between the price of forward delivery and that for cash depends upon several circumstances. A strong demand for delivery ahead can carry the forward price to a premium, equal to the loss in interest which would be incurred by paying for the silver at once, and holding until the due date; or, on the other hand, an absence of such demand and pressure to sell can bring about a very heavy discount upon the price for silver deliverable within a week. In the former case the premium is limited to the rate of interest, but in the latter case, the only check to the amount of discount is the view taken by the market as to the future prospects of silver.

This matter of delivery is of extreme importance to all who operate in silver. Sales for forward delivery appearing safe and reasonable at the time when they are made, may yet involve extremely serious losses to the seller, owing to causes beyond his control. For instance, a smelter may sell 100,000 ounces for delivery in two months, and a strike may break out, or his consignment of ore may be delayed either in shipment or process just when the market happens to be denuded of spot supplies. Or a bank may buy a quantity of Eastern exchange bills payable in silver, and may sell a quantity of silver as a 'hedge.' When the paper is redeemed by the drawee in silver, and the bank may desire to buy back the silver, the market may prove unfavourable through circumstances quite beyond its control.

Against the risk of such losses may be set off opportunities of gain which may occur. It is possible for dealers in forward silver to obtain a profit by a saving in interest, or on account of an alteration in the relation of the prices fixed for the two deliveries. In other words, a holder of silver for forward delivery may find it advance from a discount to a premium.

The existence of a price for forward delivery is necessarily an incentive to speculation, but its chief

utility is to afford to smelters, and to the Eastern Exchange Banks, or to merchants connected with China trade, facilities to carry out their legitimate operations. By legitimate, it is desired to denote operations which are germane to the discharge of their ordinary commercial business.

In normal times, cautious speculation in silver is a useful feature of the market. There are sometimes periods when the silver market falls into the doldrums, and acute operators, who may have special means of gauging the situation, are quite justified in taking supplies off the market when it is temporarily overburdened, and giving out when it is short of stocks.

The remuneration of brokers consists of $\frac{1}{8}$ per cent., which is paid by the buyer. Silver is sold free of charge, and thus only a mere 2s. 6d. per £100 separates the buyer from the seller. As between brokers themselves, the brokerage is divided—that is to say, a broker sells to another plus $\frac{1}{16}$ per cent., and buys from another plus $\frac{1}{16}$ per cent.

In days gone by most of the American sales in this market were made through brokers in New York, but the great American smelting combinations which have been created in recent years, as well as many mines, prefer to deal direct.

Business is done occasionally in 'options,' which are based, as a rule, on the forward price. Demand for accommodation of this character is fitful, and is usually a symptom of speculative interest. In the ordinary way this method does not enter into the normal business life of the market. The period fixed is usually for two months, but sometimes an arrangement is made for three to six months, rarely for longer. When no wide fluctuations are expected, an option for two months to call or put silver costs about 2 per cent. of the price, plus a brokerage of $\frac{1}{8}$ per cent. calculated upon the value of the silver.

To give a concrete illustration, when the price of silver for forward delivery is fixed at 24d. per ounce standard, and it is desired to buy 'the call,' or an option

of demanding at the end of two months from the date of the contract, £10,000 worth of bar silver at 24d. per standard ounce against payment of £10,000, the outlay would be £208, 6s. 8d. (½d. on 100,000 standard ounces) plus £12, 10s. brokerage. The reverse operation 'the put,' or the right to compel the grantor of the option to accept silver at basis price, would cost the same sum.

It is the custom of the bullion market for the buyer to pay cash against silver purchased on the day that he is liable under the contract. In this way, it is often necessary to pay some days before silver is shipped, the silver remaining at the buyer's disposal in the meantime.

Sometimes shipping companies require silver bars to be packed, especially if land transit be necessary at the end of the voyage. In modern times, however, the vast bulk of silver bars travel naked. Brokers arrange shipment and packing on behalf of their clients, and frequently insurance also. Naturally, the extensive experience in these matters possessed by brokers renders it advisable to entrust such work to their skilled hands.

Unless otherwise specified, contracts imply delivery at the office of the brokers, who are agreeable to store the silver by arrangement, until the buyer desires to ship or resell. The Bank of England has been willing as a rule to take custody of silver bars at a fixed rate of 6d. a bar for each month or part of a month; if the number of bars deposited at one time were less than fifty, the charge was 1s. per bar.

The stock in London varies considerably. In recent years the amount has always been substantial, but not always available. It is composed of silver held on account of the China banks, for the purposes described in the chapter devoted to China, of silver held for better prices, and of silver upon which money has been borrowed, until the period when forward contracts fall due. It may be mentioned incidentally that each prolongation of a contract for forward delivery entails two contracts. When silver has been sold for forward delivery, the silver must be bought for the date when delivery falls due, and a

fresh sale made for a further term, and *vice versâ* on the due date for delivery of silver, which the buyer does not desire to pay for or sell. The prolongation for a new period of two months carries only one brokerage of $\frac{1}{8}$ per cent. which figures on the 'bought' contract.

The bulk of the silver dealt in consists of bars weighing from 900 to 1300 ounces, and the metal is weighed to one quarter of an ounce.

Especial care has been devoted to maintain the accuracy of the London assay. For this reason all bars, with the exception of certain French and German bars, from refineries associated with the governments of these countries, are assayed in London by one of the four official assayers to the Mint, Bank of England, etc., namely Messrs. F. C. Claudet, D. C. Griffith and Co., Johnson and Sons, and Johnson, Matthey and Co.; upon the basis of their report silver passes from the seller to the buyer, and their assay is indisputable. The quality is reported to a fineness of one part in a thousand. Nearly all bars current in the market, apart from those refined in London, are of a quality $\frac{999}{1000}$, which is the highest quality reported.

Silver refined in London is usually made of the fineness $\frac{996}{1000}$, in order to suit the convenience of the Indian market. Silver bars reported any quality from $\frac{996}{1000}$ to $\frac{999}{1000}$ inclusive are considered good delivery as fine silver.

The price is fixed at so many pence per standard ounce. The British standard is 925 parts to the 1000 fine. A purchase of 100,000 standard ounces at 24d. per standard ounce means that the buyer will obtain an amount of fine silver in the form of bars about 1100 ounces each, assaying $\frac{996}{1000}$ to $\frac{999}{1000}$ which will contain as near as possible 100,000 standard ounces of silver, at a cost of £10,000 plus £12, 10s. brokerage. Any difference in standard weight over or under is adjusted at the contract price.

The strength of the link between the London silver market and the Orient is shown by the following table compiled by the director of the United States Mint :

**The exports of Silver from London to India, China, and the Straits since* 1881 *have been as follows* :

Calendar Year.	India.	China.	Straits.	Total.
	$	$	$	$
1881 . . .	12,375,612	3,898,860	3,577,729	19,852,201
1882 . . .	18,604,945	1,584,318	7,354,255	27,543,518
1883 . . .	18,040,140	4,212,574	11,189,631	33,442,345
1884 . . .	26,073,909	5,018,714	8,136,097	39,228,720
1885 . . .	30,913,667	3,160,315	3,108,146	37,182,128
1886 . . .	21,159,591	1,769,425	2,892,064	25,821,080
1887 . . .	19,798,328	1,427,179	2,766,946	23,992,453
1888 . . .	21,162,116	1,153,002	3,219,321	25,534,439
1889 . . .	28,392,786	2,731,861	8,181,141	39,305,788
1890 . . .	35,673,177	1,284,498	4,441,197	41,398,872
1891 . . .	21,717,992	1,177,620	10,754,800	33,650,412
1892 . . .	35,180,897	719,668	18,622,825	54,523,390
1893 . . .	34,319,877	11,635,650	7,847,295	53,802,822
1894 . . .	24,391,351	13,279,564	6,002,565	43,673,480
1895 . . .	17,638,610	8,042,003	3,668,772	29,349,385
1896 . . .	23,874,942	3,602,597	4,025,257	31,502,796
1897 . . .	28,250,305	2,721,522	3,597,331	34,569,158
1898 . . .	20,984,625	3,721,656	1,971,443	26,677,724
1899 . . .	25,597,912	6,929,117	1,396,223	33,923,252
1900 . . .	37,916,065	11,252,496	3,922,477	53,091,038
1901 . . .	36,987,395	4,101,764	3,150,630	44,239,789
1902 . . .	30,987,195	991,793	5,363,710	37,342,698
1903 . . .	36,125,636	1,508,907	3,999,674	41,634,217
1904 . . .	46,366,153	2,495,502	385,758	49,247,413
1905 . . .	36,754,830	4,315,841	186,382	41,257,053
1906 . . .	73,997,060	2,096,002	8,516	76,101,578
1907 . . .	51,935,064	2,420,354	3,448,645	57,804,063
1908 . . .	45,133,819	3,608,023	802,413	49,544,255
1909 . . .	32,477,074	9,538,340	557,701	42,573,115
1910 . . .	35,090,872	7,100,223	..	42,191,095
1911 . . .	43,131,303	5,208,615	..	48,339,918
1912 . . .	58,181,441	9,329,080	..	67,510,521
1913 . . .	47,793,897	3,674,207	..	51,468,104
1914 . . .	27,554,123	243,325	..	27,797,448

The value of the world's production in 1914 was about $121,000,000, whilst it will be observed that the average of the last five years' shipments from London alone to the East amounted to $47,000,000 or nearly 40 per cent.

The chapter may fitly conclude with the admirable table issued each year by Messrs. Pixley and Abell, by means of which the course of the price and the reason therefor may be traced for the greater part of one hundred years.

* These figures cannot yet be brought up-to-date owing to the suppression of published statistics during the war.

STEAM WAGONS LOADING SILVER FOR SHIPMENT BY THE BRITISH INDIA S.N. CO.'S STEAMER.

(*p. 172.*)

A Table showing the Fluctuations, in London, in the Price of Bar Silver per Oz. Std. from January 1833 *to December* 1916.

Years.	Yearly Average	Highest Price.	Lowest Price.	Export of Silver to the East.	Imports of Silver Bars and Coin.	Average Bank Rate of Discount	Remarks.
1833	59 3/16	59 7/8	58 3/4	£1,895,023	No Statistics of Imports of Silver obtainable prior to 1858.	From 1784 to May 1839 the rate never exceeded 5 %, nor was less than 4 %.	Continuance of East India Company. Slavery abolished, Compensation to Owners, £20,000,000. Renewal of Bank Charter, Bank Notes a Legal Tender.
1834	59 15/16	60 3/8	59 3/4	2,146,465			Great Importation of Gold into New York. Substitution of Metallic Currency for paper in the United States.
1835	59 11/16	60	59 1/4	2,036,167			Extinction of United States National Debt. Bank of United States wound up, owing to refusal of Congress to re-charter it.
1836	60	60 3/8	59 3/8	2,610,101			Banking and Commercial Embarrassments in United States. Spanish Civil War.
1837	59 9/16	60 1/4	59	3,010,190			Commencement of Panic in London. Discounts refused. Many houses trading with the United States stop payment. Accession of Queen Victoria. Rebellion in Canada.
1838	59 1/2	60 1/8	59 3/8	1,945,264			Resumption of Specie Payments in United States. Famine in various parts of British India. Afghan War.
1839	60 3/8	60 5/8	60	1,786,253		5 1/2 %	Banks in United States suspend Payments in Specie. War with China.
1840	60 3/8	60 3/4	60 1/8	1,841,335		5 ,,	Misunderstanding with France. Treaty of London for Settlement of Eastern Question.
1841	60 1/16	60 3/8	59 3/4	3,143,292		5 ,,	Great Depression in every branch of Manufacturing Industry.
1842	59 7/16	60	59 1/8	4,794,678		4 ,,	Peace with China. Income Tax Act passed.
1843	59 3/16	59 5/8	59	3,752,472		4 ,,	Treaty of Commerce opens China to all Nations.
1844	59 1/2	59 3/4	59 1/4	2,495,959		4 ,,	Bank Charter Act passed. Consols 101 1/4. Prior to September this year, the Bank never reduced the Rate below 4%.
1845	59 1/4	59 7/8	58 7/8	2,939,922		3 ,,	Railway Mania. Sikh War.
1846	59 5/16	60 1/8	59	1,973,391		3 1/4 ,,	Commercial and Railway Panic. Repeal of Corn Laws.
1847	59 11/16	60 3/8	58 7/8	4,204,503		5 ,,	Year of Panic. £10,000,000 granted for Relief of Famine in Ireland. Gold discovered in California.
1848	59 1/2	60	58 1/2	3,396,807		3 3/4 ,,	Sikh War.

Table showing the Fluctuations, in London, in the Price of Bar Silver—continued.

Years.	Yearly Average	Highest Price.	Lowest Price.	Export of Silver to the East.	Imports of Silver Bars and Coin.	Average Bank Rate of Discount	Remarks.
1849	59¾	60⅛	59⅜	£3,811,809	No Statistics of Imports of Silver obtainable prior to 1858.	3 %	First importation of Californian Gold into England. Annexation of the Punjaub.
1850	60 1/16	61½	59⅓	5,052,059		2½ „	Average of Consols 96½.
1851	61	61⅝	60	1,715,100		3 „	Discovery of Gold in Australia.
1852	60½	61⅞	59⅞	2,447,450		2 „	Consols touched 102, and averaged 99⅝.
1853	61½	62⅜	60⅝	3,117,980		3½ „	Australian Mint established.
1854	61½	61⅞	61	3,095,490		5 „	Russian War began.
1855	61 5/16	61⅝	60	6,431,733		4¾ „	Loan of 16 millions. Fall of Sebastopol.
1856	61 5/16	62¼	60½	12,113,991		5¾ „	Russian War ends.
1857	61¾	62⅜	61⅜	16,731,915		6¾ „	Panic. Suspension of Bank Act. Indian Mutiny. Loan of £1,000,000 to East India Company.
1858	61 5/16	61⅞	60¾	4,753,933	£6,700,000	3½ „	End of Indian Mutiny.
1859	62 1/16	62¾	61¾	14,828,521	14,772,460	2¾ „	Loan of £5,216,528 to East India Company.
1860	61 1/16	62⅜	61¼	8,478,739	10,394,000	4¼ „	Commercial Treaty with France.
1861	60 3/16	61¾	61⅛	6,824,807	6,590,000	5¼ „	Financial Depression in India. American Civil War begins.
1862	61 7/16	62⅛	61	10,091,460	10,753,000	2½ „	Great Distress in Cotton Manufacturing Districts. Panic.
1863	61⅜	61¾	61	8,263,011	10,888,130	4½ „	Large Exports of Gold to the Continent to pay for Silver.
1864	61⅜	62½	60⅝	6,254,004	10,827,300	7½ „	£13,000,000 Silver exported from France.
1865	61 1/16	61⅞	60½	3,598,058	6,980,000	4½ „	Close of American War.
1866	61⅛	62¼	60⅜	2,365,626	10,778,000	7 „	Commercial and Joint Stock Companies Panic. Bank declined to sell Bar Gold.

1867	60 9/16	61¼	60 5/16	£642,912	£8,020,000	2½ %	Great decline in export of Silver, only £2,500,000 sent from France.
1868	60½	61⅛	60⅛	1,635,642	7,716,420	2¼ „	Abyssinian Expedition.
1869	60 7/16	61	60	2,362,943	6,730,000	3¼ „	Distress in Lancashire.
1870	60 9/16	62	60¼	1,579,473	10,649,000	3 „	Franco-Prussian War. Panics.
1871	60½	61	60 3/16	3,712,473	16,520,000	3¼ „	£8,500,000 Gold exported to Hanse Towns. { Peace between France and Germany.
1872	60 5/16	61⅛	59¼	5,654,451	11,140,500	4½ „	£8,050,000 do. do. { Commencement of decline in price of Silver.
1873	59¼	59 15/16	57⅞	2,497,576	12,302,220	5⅜ „	£10,000,000 do. do. { German Government announces the demonetisation of Silver.
1874	58 5/16	59½	57¼	7,092,726	11,797,990	3¾ „	Enormous Increase of Bullion in Bank of France, £22,000,000, mostly Gold.
1875	56⅞	57⅝	55½	3,714,404	9,506,757	3¼ „	Heavy Commercial Failures. Large Export of Gold to Germany. Continued decline in price of Silver.
1876	52¾	58½	46¾	10,914,407	13,585,608	2½ „	Remarkable fluctuations in rates of Indian Exchanges and Bar Silver.
1877	54 13/16	58¼	53¼	17,007,458	21,625,652	2⅞ „	Great Famine in India. Russo-Turkish War.
1878	52 9/16	55¼	49½	5,842,577	11,453,105	3¾ „	General Depression in Trade. Large Bank Failures. Russo-Turkish War ended.
1879	51¼	53¾	48⅞	7,034,967	10,520,012	2½ „	Suspension of Sales by German Government. Marked diminution in production of Californian Mines.
1880	52¼	52⅞	51⅛	6,135,520	6,827,471	2¾ „	Consols touched 100⅞. Reported existence of large quantities of Gold in South India.
1881	51 1/16	52⅞	51	4,288,009	6,902,210	3½ „	Meeting of Conference in Paris respecting Bimetallism, which adjourned without coming to any practical conclusion.
1882	51⅛	52 7/16	50	6,423,270	9,243,375	4⅛ „	War with Egypt.
1883	50 9/16	51 3/16	50	7,125,454	9,468,002	3½ „	Completion of Italian order for Gold.
1884	50⅜	51⅜	49½	8,418,522	9,546,496	2 9/16 „	War in Egypt, Income Tax increased. Franco-Chinese Complications.
1885	48⅝	50	46⅞	8,010,925	9,377,601	2⅞ „	Suspension of the Coinage of the Bland Dollar, recommended by the President of the United States.
1886	45⅜	47	42	5,846,222	8,166,249	3 „	Great Depression in Trade.
1887	44⅜	47⅛	43 1/16	6,327,113	7,471,639	3⅜ „	Depression in Trade continued, assisted by War rumours.

Table showing the Fluctuations, in London, in the Price of Bar Silver—continued.

Years.	Yearly Average.	Highest Price.	Lowest Price.	Export of Silver to the East.	Imports of Silver Bars and Coin.	Average Bank Rate of Discount.	Remarks.
1888	42 7/8	44 9/16	41 5/8	£7,807,400	£7,825,380	3 1/2 %	Deaths of Two German Emperors successively caused great uneasiness. War rumours subsided later. Stringency of Money earlier than usual towards close of the year.
1889	42 11/16	44 3/8	42 1/16	8,575,713	9,184,940	3 1/2 ,,	Home Coinage of Silver unusually large.
1890	47 11/16	54 5/8	43 11/16	8,456,709	10,385,659	4 1/2 ,,	Serious Panics in London and New York. Extension of Silver Legislation in the States.
1891	45 1/16	48 3/4	43 1/2	7,082,719	9,316,200	3 5/16 ,,	Chilian Revolution. Failure of United States Legislation to maintain Silver prices. Large Continental Orders.
1892	39 13/16	43 3/4	37 15/16	11,881,885	10,746,382	2 1/2 ,,	Further depression in Silver. Inoperative Monetary Conference at Brussels.
1893	35 5/8	38 3/4	30 1/2	11,649,411	11,913,395	3 ,,	Indian Mints closed to free Coinage of Silver. Repeal of Sherman Act. Australian Bank Crisis.
1894	28 15/16	31 3/4	27	10,041,162	11,005,507	2 1/16 ,,	Duty of 5% imposed on Silver entering India. War between China and Japan.
1895	29 7/8	31	27 3/16	6,484,933	10,669,682	2 ,,	Speculation in African Mines. Large Indemnity to Japan. Consols touched 108 1/8. U.S. Currency Difficulties.
1896	30 3/4	31 9/16	29 3/4	6,897,015	14,329,116	2 1/2 ,,	Consols touched 114. Defeat of Silver party in U.S. Election. Extensive Coinage of Silver by Russia.
1897	27 9/16	29 13/16	23 3/4	7,223,397	18,032,091	2 5/8 ,,	Turco-Greek War. Famine and Plague in India. Gold Standard adopted by Japan.
1898	26 15/16	28 5/16	25	5,949,285	14,677,799	3 1/4 ,,	Spanish-American War. Indian Monetary Conference. European Extension in China. Soudan reconquered.
1899	27 7/16	28 7/8	26 5/8	7,742,829	12,727,989	3 3/4 ,,	Boer War. 6% Bank Rate in December. Consols down to 97 3/4.
1900	28 1/4	30 3/16	27	9,985,642	13,232,300	3 5/16 ,,	Continuation of Boer War. Large Coinage of Rupees. Boxer Rebellion in China.
1901	27 3/16	29 9/16	24 15/16	9,018,419	11,501,678	3 3/4 ,,	Death of Queen Victoria. Assassination of President M'Kinley. Continuation of Boer War. Combination of American Smelters.
1902	24 1/16	26 1/8	21 11/16	7,565,305	9,764,296	3 3/8 ,,	End of Boer War. Heavy Fall in Silver. War Indemnity unsettles China Trade.
1903	24 3/4	28 1/2	22 1/8	8,051,780	10,310,330	3 3/4 ,,	Straits Settlements and Siam adopt Gold Standard. Large Purchases by the Indian Government. U.S.A. buy for new Philippine Coinage. Mexican Currency Commission.

	1904	26 3/8	28 9/16	24 7/16	£10,038,319	£11,687,339	3 1/4 %	Russo-Japanese War. Monetary Reform in Mexico. Continued Buying by Indian Government.
	1905	27 13/16	30 5/16	25 13/16	8,643,405	12,992,014	3 „	Mexican Mints closed to free Coinage of Silver. End of Russo-Japanese War. Internal Troubles in Russia. Continued Buying by Indian Government.
	1906	30 7/8	33 1/8	29	15,566,334	17,288,063	4 1/4 „	Heavy Purchases by Indian Government. Large Exports of $ from Mexico. Resumption of Purchases by U.S. Government. Straits Exchange fixed at 2/4 per $.
	1907	30 3/16	32 7/16	24 3/16	12,752,230	15,983,892	4 7/8 „	Cessation of Indian Buying. Sharp Fall in Silver. Financial Crisis in U.S.A. Bank Rate 7%
	1908	24 3/8	27	22	10,243,968	10,326,889	3 „	Large Gold Exports to Paris. General Depression of Trade. Political Unrest in South-Eastern Europe.
	1909	23 11/16	24 7/8	23 1/16	8,936,715	11,814,889	3 1/16 „	Some Improvement in Trade. Good Crops, especially of Cotton, in India.
	1910	24 5/8	26 1/4	23 3/16	8,648,443	14,100,310	3 11/16 „	Death of King Edward VII. Indian Import Duty on Silver increased from 5% *ad. val.* to 4 annas per ounce.
	1911	24 9/16	26 1/8	23 11/16	9,865,796	14,293,747	3 7/16 „	Strikes and Labour Unrest in England. Rebellion in China. Italian War in Tripoli.
	1912	28 1/32	29 11/16	25 1/8	14,345,474	16,778,304	3 3/4 „	Establishment of Provisional Government in China. Indian Government purchased £6,000,000 Silver. War between Turkey and Balkan States.
	1913	27 9/16	29 3/8	26 1/16	10,739,978	14,495,049	4 3/4 „	China Loan of £25,000,000. Indian Government bought £5,500,000 Silver. Failure of Indian Specie Bank. Civil War in Mexico.
	1914	25 5/16	27 3/4	22 1/8	5,745,468	11,950,090	4 „	Outbreak of Great European War and consequent Disorganisation of money and Stock Markets. Record Home Coinage of Silver, Bank Rate reached 10% in August.
	1915	23 11/16	27 1/4	22 5/16	3,828,168	10,560,161	5 „	Continuation of Great War. Heavy Coinage of Silver, both Home and Abroad.
	1916	31 5/16	37 1/8	26 11/16	4,412,000	12,395,000	5 1/2 „	
					(for 1916) approximate			
	1917	40 7/8	55	35 1/16	no statistics		5 1/8 „	Continuation of Great War. The United States declares war against Germany.
K	1918	47 9/16	49 1/2	42 1/2	„ „		5 „	Armistice with Enemy Countries signed on 11th November. Surrender to Allies of Enemy Fleets, Arms, &c. Serious Political unrest in Russia and Germany. Pittman Silver Act passed in the United States.

CHAPTER XVI

THE TRAVELS OF SILVER

Its ancient habitat—Solomon's wealth—Silver little known to ancient Chinese—Absence of silver deposits in India—Phoenician enterprise—Spain's discoveries extend Spanish trade—Pieces of eight—Spanish decline—Buccaneers—Bombay and the British Crown—Spain and China—India a silver sink—Its overflow throughout Asia—Caravans and highways—Oriental love for silver—African demand springing up—Modern travels—A cobalt vein—Embarkment at New York—Last voyage of *Lusitania*—Euston Station—Bullion Rooms—Stacking—Weighing—Unpacking dollars—P. and O. Offices—Farewells at Station—Baskets aboard—The Bay—The crouching lion—Egypt—Pharaoh's host—Pilgrims—Bullock wagons at Bombay—Mohammedans—China terminus.

SILVER has always been a great traveller, even in the days when a sea voyage partook of the heroic. The improved methods of sea transit during the last four hundred years and the increased production have greatly extended its journeys. In early times a large proportion of the mines from which supplies were obtained were situated in the vicinity of the busy haunts of men. Greece, Spain, Germany, France, and Great Britain produced nearly all the silver available for the use of the Old World. The frequent references to silver in the Bible show how freely it circulated as an article of commerce, and as a medium of exchange, in the populous countries which abut upon the sunny shores of the Mediterranean Sea.

A balance of trade existed in those days between commercial centres in somewhat the same way as it does now, and it was settled probably by payments on a silver basis, just as it is now adjusted on a gold basis. The Great War has shown what an enormous drain of gold can take place from countries whose trade balance moves heavily against them. The rise of a great empire in the

past always drew metallic wealth into its coffers. Prestige conferred by pre-eminence in power stimulated its commerce, and introduced in the long run those habits of luxury which eventually led to a fall.

The reign of Solomon did not equal in barbaric military splendour that of Nineveh or Babylon at the acme of their power, but the wisdom of the king, and the respect in which he was held by neighbouring nations, had such a fertilising effect upon the commerce of his kingdom, that the balance of trade set in heavily in its favour, and we read that ' Silver was nothing accounted of in the days of Solomon.'

The distance of the principal silver mines of those days from Palestine was not great. The coast of Spain and the shores of Greece were washed by the Mediterranean. The waves of the same sea lapped the beach of Tyre, between whose ruler and King Solomon there existed a close bond of amity.

It is curious to reflect that a high condition of civilisation existed in China at the same epoch, a civilisation to which silver was practically unknown, and yet that this very country some thousands of years afterward should attract so large a proportion of the world's output. Silver deposits undoubtedly exist in China, but a great obstacle to their exploitation hitherto has been the reverence paid by the Chinese to their ancestors, and the strong objection to any disturbance of the buried dead. Customs conflicting with the interests of the living are now less observed, and before long the valuable mineral treasures hidden in Chinese soil will doubtless see the light.

Practically no deposits of silver are to be found in India. This fact is confirmed in a curious fashion by the proverbs of the country. Proverbs, be it remembered, are never of modern composition, but are the survival of ancient wisdom. Among thousands of Tamil proverbs—which on account of their aptness and wit have been tabulated by students of folk-lore—gold, which is now produced to the extent of £2,000,000 a year, and probably was mined to a larger extent in the distant past, is

mentioned scores of times, but silver only once or twice. Hence it may be inferred with reason that gold was in commoner use than silver at the period when the proverbs first obtained currency.

The lack of communication in early ages between West and East—the exceeding hazard of a voyage into the unknown—the tedium of journeying by slow stages either on sea or land—the practical impossibility of carrying supplies sufficient to last to the end of protracted journeys—were a great hindrance to the conveyance of any weighty commodity from Europe to the Orient.

The Phoenicians, the great merchants of pre-Roman days, and later on the Jews as they were dispersed among the nations, were the channels by which the jewellery and coins of early European civilisation were distributed abroad in places other than manufacturing centres. Silver in an unworked form was of little use to people unskilled in arts and crafts, but the finished results of such labour were welcomed eagerly.

In the sixteenth century a spirit of adventure swept like a wave over the Spanish nation, and wrought a wonderful change in the history of silver through the discovery of the enormous wealth of precious metals in the New World. The explorers found to their surprise a civilisation already established in Mexico and Peru. The emergence of the Aztecs from a level of barbarism to a state of enlightenment in which they raised buildings and created cities whose ruined splendour still amazes the traveller, is one of the greatest mysteries to students of history. Upon the ruins of this splendid past Spain erected a colossal empire and attained within a few decades the zenith of her fame.

In a wonderfully few years such an ascendancy was acquired by the superior military advantages of the invaders, including the use of gunpowder, that the natives of South America were reduced to a condition of practical slavery, and had to toil in the mines for the enrichment of their taskmasters. The Spaniards equipped great fleets of ships by which gold and silver treasures,

A GALLEON. (*p. 180.*)

as well as native raw products, were conveyed home. A large proportion of these native goods and of precious metals were redistributed at the great international ports, in exchange for the choicest goods that were exposed to market. The immense riches drawn from South America gave Spain the means to prosecute those warlike designs, which placed her for a while upon a pinnacle among the nations.

In those days the silver dollar, or piece of eight, adorned with the pillar of Hercules on the reverse, and therefore styled the pillar dollar, was to be seen wherever business men congregated throughout the then known world. These coins found their way into the dim and distant East, and are the favourite currency of the Province of Anhui in China even to this day. In the course of time the doom that awaits nations enervated by over-prosperity fell upon Spain. Her responsibilities outgrew her strength, her sons were more disposed to make others work for them than to work for themselves, for others to fight for them than to undertake their own battles. In a word, Spain became on the down grade.

Like swordfish around a dying whale, jealous nations and buccaneers fought for her rich carcase. Many a treasure ship fell into the hands of hardy sailors, like Raleigh, Frobisher, and Drake, or into the clutches of cosmopolitan and ruthless pirates. The tempting cargo consisted of dollars coined in Mexican mints and solid silver bars. The freight of ships captured by British enterprise was brought home to England, and minted into British coin, whilst the booty of the buccaneers was scattered in largess or revelry in many an unhallowed rendezvous, or marooned in some lonely islet of the southern seas.

Not all of these caches of buried treasure have been unearthed, for many a depositor of ill-gotten wealth died suddenly in the midst of his wild career, and the secret of his hidden hoard perished with him. Meanwhile the kegs of silver dollars, and the jumbled heap of silver ingots, still awaits the light of day.

The great discoveries of silver made in South America

and Mexico and their exploitation by Spain, had very far-reaching effects upon other nations as well as upon Spain itself. It stimulated trade generally throughout the whole world. It encouraged the opening up of new markets and the search for new fields for commerce across the seas, by advertising the visible and tangible results of adventure. India and China and other distant lands, whose very existence used to be considered fabulous, were visited with increasing frequency by the ships of maritime nations. Spain does not appear to have made many links with India, but the neighbouring realm of Portugal was one of the first to obtain a secure and firm foothold in the Great Peninsula. Her colony at Bombay afterwards became an appanage of the British Crown, as the dowry of Catherine of Braganza, Queen of Charles II. Descendants in China of converts made by Xavier, the Jesuit missionary, still exist to show how a son of Spain set out to spread her religion to the uttermost parts of the earth, and found a lonely grave in that far, foreign land. The Chinese are very tolerant as regards religion; hostility is not customary on the ground of strange tenets alone. What the Chinese resent, and resent to the death, is an assumption of superiority, or an interference with local control on the part of strangers. To this cause may be attributed the Boxer rebellion and similar anti-foreign outbreaks.

The new trade which sprang up between Europe and the East begat an extraordinary demand for silver, and the empires of India and China became one vast sink for the white metal. Century after century a ceaseless stream of silver has flowed from West to East, especially to India. Imagination fails to grasp the tons of precious metal which has been borne to that peninsula, and there lost sight of. The greater part has filtered up country, to be hammered and beaten into jewellery and artistic ware, to be retailed in the bazaars of the few cities or by hucksters in the numberless villages.

But all the silver does not stay in India. It is borne by caravans to the interior of Persia, in imminent danger of roving robbers who frequent the routes.

It is carried through the frowning inhospitable passes which form the road to Afghanistan, bordered by the fierce tribes that own nominal allegiance to the Ameer. In coin or some other form it is conveyed to Burma in payment for the magnificent crops of rice which form a staple industry of that graceful people. In lesser but still appreciable quantity it wends its way to the roof of the world, the bleak highlands of Thibet, where, until within the last few years, silver could travel, but not Europeans. Nor are the territories which fringe India a limit to the journey. Silver moves on with an ever-broadening sweep throughout the highways and byways of Asia, by caravan routes of great antiquity, to distant hamlets barely known to civilised man.

Travellers sometimes throw light upon the consumption of silver in the little known districts of Asia. From such a source we learn that the hair of Kalmuk women, who dwell in Mongolia, hangs in long and heavy plaits, generally encased in cloth covers, in order to protect their clothing from the mutton fat with which the hair is covered. These plaits, as well as their ears and fingers, are decorated with heavy silver and coral rings, and the silver brooches upon their breasts are frequently of beautiful workmanship.

Many ancient ways fell into disuse owing to the drying up of water supplies and the diversion of streams to fresh channels. In the course of two and a half years' travels through the borderlands of North India, Sir Aurel Stein traced an ancient route through the Lop desert, revealing numerous ruins along that part of it which wound through a dried-up delta. He concluded that the ancient Chinese conveyed their silk to Central Asia and the far-off Mediterranean by this discarded road. Numerous pieces of exquisite Chinese silks and brocades were found in the cemeteries, and are expected to open up a new chapter in the history of textile art. In that part of the desert, which was waterless for a distance of some 150 miles in those distant times, he was able to trace with accuracy the route of ancient caravans by finds of coins and other

small objects accidentally dropped during the journey. In one place the exact direction traversed by a convoy was clearly indicated by hundreds of coins strewed upon salt-encrusted ground. They had probably been dropped from a load during a night march, and had remained untouched for at least 1600 years.

Attempts have been made to trace the movements of silver across the borders of China, but with ill success. On camel or mule back, or in the rudest of vehicle—up hill and down hill—over tracks that render the accomplishment of each day's travel a stupendous miracle, silver is ever moving—generally outwards from India, but sometimes to and fro. The truth is that silver fulfils a real need from which Eastern people suffer. They produce no quantity of silver worth speaking about, yet the metal is ideal for the local money payments of folk whose means are scanty, as well as for those who have business affairs to transact at a distance. It is not so cumbersome as copper or tin, it is not so expensive as gold, whilst it possesses everywhere a value as a commodity, as something which can be used for luxury and adornment, and also the power to act as money pure and simple.

Now that Africa has been taken under the tutelage of the Great Powers, and local enmities are held in check, silver will enter upon fresh travels. Already an inquiry has sprung up from the most important communities of that great continent for silver to be made into trinkets suitable for the native markets. In past centuries coins were a common form of adornment as necklaces or buttons in Africa, as also in Asia and the Americas, but designs by local silversmiths are now beginning to attract the most fashionable of the élite. A considerable demand for silver goods manufactured in India has arisen in Uganda and Zanzibar—another odd journey for silver to take, for silver traverses the Gulf of Suez on its way to India, and thus has to return along part of the original route after being manufactured into goods for sale. This enormous and constant flow of metal from West to East seizes hold of the imagination.

S.S. 'LUSITANIA' OFF THE OLD HEAD OF KINSALE. (*p. 184.*)

It is now proposed to trace the modern pilgrimage of silver from the mine, where it is extracted, to its ultimate resting-place, either in the transforming office of the mint, or in the beautifying hands of the craftsman.

In a narrow cleft of rock, some feet below the surface of the ground, in the Cobalt district of Ontario, a man can be seen extracting lumps of ore with a pickaxe, and shovelling them into baskets. The vein upon which he is working shimmers with a whitish sheen, and indicates to the eye of the least expert the presence of silver in rich proportion. Placed within a crucible the ore fuses rapidly in the heat of the furnace, and the molten metal is poured into a mould from which emerges a bar of coarse silver. This forms part of a carload despatched from Cobalt Station via the Grand Trunk Railway to New York. In the case of valuable goods speed is a desideratum, and no time is lost in placing the consignment upon the fine Cunarder, *Lusitania*, whose huge bulk dwarfs the ferry boats and tugs in the vicinity.

Buried in the bosom of the greyhound of the deep, unconscious of the heart-throbs of its engines, the valuable cargo is borne swiftly past the statue of Liberty, which would fain suggest that in leaving the shores of the United States freedom is left behind. Quite a mistake, for the *Lusitania* is on its way to a tight little island, whose inhabitants have ever been prone to sing, with a certain amount of resolution—'Britons never shall be slaves!'

Eventlessly, save for changing skies and ever restless seas, this good ship performed its journeys, pregnant with blessings to mankind, until, the victim of a foul deed, which the world will never forget, it sank beneath the waves, together with a freight of 1195 souls, of whom 291 were women and 94 children.

The bars, whose Odyssey we are hymning, reach Liverpool in safety, and are conveyed from the landing-stage to the terminus of the London and North-Western Railway, placed in locked vans and borne to Euston Station, where the bars are sorted as much as possible

according to their various marks before being placed into wagons for delivery to the bullion brokers. When the consignment is large, this operation takes a considerable time owing to the weight of the metal handled, and also to the difficulty of deciphering the distinctive marks in the often poor light at the platform. The fact that the bars of certain mines have differing shapes is a great help in sorting.

Wagons deliver the bars to the offices of the brokers, to whom the bars are either consigned or to whom instructions to deliver have been given by the consignees. Again the handling is tedious, for a further sorting has to be made when consignees desire the delivery of their bars to be divided, and sometimes the bars have to be placed upon a lift before being lowered to the bullion rooms. About eighty bars are carried in one wagon, and as many as thirty wagons are employed at one time in making delivery of a large shipment.

The bars are placed in trucks, and drawn alongside the scales in the bullion room. As the number of bars usually exceeds the capacity of the trucks, the overplus is stacked, an operation facilitated by the shape of the bars, which, as a general rule, have the upper and lower sides sufficiently level for the purpose. The usual method is to make a layer of three, placing two bars side by side, and the third across the end. In each succeeding layer care is taken that a bar lies crosswise over the ends of the two below, so as to bind the 'stack' together. Unless this be done, there is a danger of the stack proving unstable by a bar slipping out of place. When the piling is done carefully, about fifty can be placed in a stack about five feet high, which is as high as a man can raise a bar with comfort.

Two species of truck are in use. A hand-truck, which may carry up to eight bars piled on each other, with a piece of wood under the front of the bottom bar, so as to cant the bars backward. Even with this precaution bad piling or careless handling may precipitate the bars around the floor, an accident quite sufficient to cause serious injury to persons in the

vicinity. A four-wheel truck, upon which fifty or more bars can be placed, is the other form in use. Great care is here necessary—first that the truck is well made and in sound condition; next that the mass of metal is balanced in the centre and well bound together by cross stacking. The weight imposed upon one truck often exceeds a couple of tons, and as the load is raised two feet or more above the ground and has to be moved over irregular flooring and metal slopes, the need of precaution requires no further emphasis.

Whilst the bars are on these trucks, pieces for assay are cut off, and placed on the top of each respective bar. The number of the bar is called out, and the bar placed upon the scale. The man who weighs is provided with the weight of each bar. If originally expressed in kilograms, the weight in ounces is duly calculated. When he is satisfied that the pointer of the scale registers a slight fraction above the weights placed in the scale-pan, he records the total. The assay piece is taken from the top of the bar, and wrapped in a paper numbered to correspond with the bar, and is sent to one of the four official assayers for report. The bars are then placed in an adjoining strong-room, and piled in close and high stacks so as to economise space, until they are required for delivery elsewhere in London, or for export abroad.

Silver coin arrives in wooden boxes containing—in the case of dollars—about 3000 pieces, 1000 in a bag. It is interesting to watch the ease with which an expert workman trundles each box into position, tips it upon end, severs the iron hooping and splits the side with one blow of the axe, lets the box slide flat on the floor, and, with one more blow, splits the upper iron band, and lid as well. Then with a blow sideways from the back of the axe, he lays the box upon its side, wrenches the split side open with his hands if loose enough, or with his axe if it clings together, and in less than a minute the three bags are lying loose around the fragments of the box. Each bag of coins is then emptied separately into the scale and weighed. Though more difficult to stack, bags of coin can be built up into a solid

wall, provided the two ends are securely held by silver bars or by the sides of the safe.

In the majority of cases silver bars proceed upon their travels intact, but occasionally the metal has to be melted into suitable shape and weight so as to conform with the needs of transit across foreign countries by post or otherwise. Sometimes bars have to be packed in boxes containing one, two, or four bars, but mostly the bars proceed upon their travels as naked as they enter the country.

When despatched to the East, they are conveyed to the City offices of the P. and O. Steam Navigation Company, having been previously marked with both a stencilled and an indented distinctive letter. Here the port-mark and a special number are stencilled on the bars or boxes by the officials of the company, who from that moment are responsible until due delivery is made at the destined port. If an order be executed very late, the consignment has to accompany the train which takes passengers from Liverpool Street Station to Tilbury, and to be an apathetic witness of many an impassioned farewell. The bulk of the bars, however, are taken by train to the dock, where the steamer may lie, in charge of the Port of London authorities to the terminal of the railway. Here a number of bars are placed in a strong wicker basket, which is slung from a crane through the open hatchway, and lowered to the orlop deck, where the bars are stowed so securely that no rough sea can disturb them. The consignments required for the ports touched first are placed in the handiest position for removal. Similar baskets are carried in the ship, and at each port bars which have to be discharged are placed in them, raised by the ship's tackle and lowered upon the quay.

The journey eastward is one great pageant, in which a thoughtful traveller is reminded continually of the Past, from which has sprung the British Empire of To-day. He bids farewell to the time-worn *Victory*, near, but not in sight, and pays the tribute of remembrance to the great sailor who breathed his last within its wooden walls. His eyes rest at times upon modern

monsters of the deep to whose protection he will owe his safety from a foreign foe during the long voyage in prospect. The coast of England fades slowly from his view.

After the Bay of Biscay has wreaked its accustomed vengeance upon the invaders of its domain, the steamer passes many a spot where gallant struggles took place upon the sea to wrest from Spain dominion of the seas, and galleons galore yielded up their silver treasure to the hardy seamen of good Queen Bess. The shade of the great Nelson hovers around Trafalgar Bay, and seems to speed the passing traveller. Like a couchant lion, Gibraltar looms in sight, and overboard go the boxes of silver for the near-by coast of Africa, whence anon dusky Moors will bring back the metal fashioned into quaint jewellery and small hammered dishes wherewith to ease the tourist of superfluous cash.

Swiftly the good ship passes the islands of the Mediterranean, where peasant lassies produce the chain work which is made up into silver bags and purses, until ere long the beautiful harbour of Malta is entered, and the visitor again dips into his pocket to buy the filigree work for which the island is famed. Skirting the islands of the Ægean Sea, where most of the silver workers in coins or trinkets had their home at the beginning of the present era, Port Said raises a modest head above the horizon, and by the Suez Canal is skimmed the edge of Egypt, where, before the British occupation, it was stated that every respectable merchant minted more or less—usually less—respectable piastre silver pieces. Curious silver coins, 2½d. in value, with a cutting edge like a knife!

During the journey to Aden the vessel passes over the spot where the warrior host, chariots and all, struggled through the churned-up sand, until the returning tide rolled over the pride of ancient Egypt, whose gaudy trappings bedecked with silver bosses lie fathoms deep beneath the shifting bottom of the Red Sea.

The Arabian Peninsula on the port side of the ship owes its prosperity, remarkable for so arid a territory, to

the visits of pilgrims to the sacred shrines of Mohammed. Here silver coins, Maria Theresia dollars, Dutch 2½ guilders, and French five-franc pieces, all large coins and handsome, selected because of their size and excellent quality, find ready circulation in Mecca and its vicinity, when disbursed from the pilgrim's wallet, and are carried on camel back to the interior. Some day a prosaic locomotive may tug the budding Hadji to the tomb of the Prophet, and he may pay his bill in sovereigns or in British treasury one-pound notes, surcharged with Egyptian characters. The British shilling is a stay-at-home coin, and has followed the fortunes of the emigrant to the distant British colonies with reluctance. The golden sovereign, on the contrary, circulates in every civilised portion of the globe,

On arrival at Bombay the silver bars are taken off the ship, and carried in bullock wagons or motor lorries in the custody of the Anglo-Eastern bank to which they are consigned, and with which they remain for the ten days allowed to the choksey or purchaser, before being taken up and their value paid. From the offices of the bank the choksey takes them to his shop, where they remain until sold to a shroff or bazaar buyer for immediate delivery or for an ensuing settlement. When the shroff takes delivery, he despatches them to this up-country customer, either whole or in cut pieces. The ultimate consumer buys from the up-country dealer, and carries his morsel of silver to the silversmith, in whose melting-pot the actual piece of the bar created by furnace heat in the refinery in Canada, loses its identity, again by means of the fiery element. Elsewhere are described the various processes by which the silversmith moulds the metal into whatever form of jewellery or silverware his customer desires. The illustrations will convey to the reader in lively fashion the journey to the Calcutta Mint of silver destined for coinage.

Still further east, the good ship carries the silver bars to China, where most of the arrivals are placed in the melting-pot, to be remoulded and alloyed down to sycee, the currency of that country.

P. & O. *S.S.* "MACEDONIA" IN SUEZ CANAL. (*p. 191.*)

CHAPTER XVII

MONEY

Paper currency—Pecuniary wealth—Stone money—Skulls and other descriptions of cash—Slaves sound currency—Pepys and tallies—Chinese backward in currency—The talent—Evolution of metal currency—Association with temples—'Whose image and superscription hath it?'—How shape of coin decided—Loss of Weight by circulation—Lydians first coiners—Ancient Greek mines—Dollars predominate—Derivation of word—The Crown Colonies of North America—Origin of $ sign—Counterfeit coin—Neufeld in captivity—The Mahdi's fraud.

THE mention of that convenience commonly called money is associated in the mind of most people with the idea of something formed out of metal. This impression is quite erroneous, for a great variety of articles have been utilised as a medium of exchange at different epochs and in diverse portions of the earth.

During the period of the Great War, the combatant nations developed an extraordinary affection for paper currency, though it should be remembered that cheques, which are such a feature of modern life, are currency, as well as notes possessing the guarantee of a State bank.

Many forms of currency still in use have survived from the dawn of civilisation. The primitive man of the East, whence the human family derived their origin, largely nomad in his habits, could not measure his wealth by the treasures of his town and country houses, for he possessed none. His eye dwelt lovingly through his tent door upon the flocks and herds browsing upon the plain beyond. Really and truly these constituted his pecuniary wealth, for the Latin word *pecus*, or cattle, is the root of the word *pecunia*, which has come in our language to comprise everything that serves to measure the value of commodities. In like manner the word 'fee' (akin to the German word *Vieh*) originally meant cattle,

whilst some say 'rupee' is derived from a Sanskrit root, *rupa*, having the same meaning. (Cf. page 240.)

Many an owner of living wealth has seen it become actively current, when subjected to an attack of wild beasts, or infected by the mad fear which burning vegetation is apt to arouse. Debts were created and paid for in the form of cattle, and certain tribes of Indians, up to the present day, pay so-called cattle rents to the United States Government. In the heart of the African continent oxen are still the media of barter.

In wide contrast to such active forms of currency are the 'fei,' which are used in Uap, one of the Caroline Islands in the southern seas. This money is chiselled out of limestone into a circular form one to twelve feet in diameter, with a hole in the centre by means of which it can be trundled along. But this is not necessary in the local systems of money; the mere ownership of the fei is enough to confer upon the fortunate possessor for the time being all the advantages of wealth, and he is quite content to leave his property outside his debtor's premises, and save himself the labour of moving the unwieldy mass. Indeed, one surpassingly fine fei was being brought to Uap upon a raft when a disaster occurred and it dropped into the depths of the sea. It was decided that the owner had not lost the value vested in the fei, and could still make payments by means of it.

During the German ownership of the island the roads fell into disrepair, and the authorities found it difficult to force the natives to undertake the necessary work. An official was sent to mark each neighbouring fei with a government stamp, and the desired result was almost instantaneously achieved. The natives hastened to repair the roads, and the government stamp of ownership was obliterated.

The natives of Papua were accustomed to purchase war canoes or wives at so many skulls apiece. The skulls, to become good currency, had to be dried, smoked, and polished. Fifty were good for a canoe, whilst a tenth of the number was considered good payment for a wife. A purchaser, short by just one skull of the price demanded

by the father of his chosen bride, must have been sadly tempted to deal a hasty blow by which the skull of his prospective father-in-law himself would complete the sum required.

Corn has been decreed frequently as a basis for the rent of lands, and is even now a currency in parts of Norway. Skins, feathers, tobacco, codfish, salt, teeth, and shells have had their day as money. At the huge market held for hundreds of years at Nijni Novgorod in Russia, where immense trade is transacted yearly, one of the first operations is to fix the price of tea, and the price, when determined, sets a standard for those of other commodities. Shell-beads, called wampum, obtained such legality as currency in the newly discovered continent of North America, that they were accepted by the colonial treasurer in payment of taxes. The slang word 'spondulix' for money in general is said to be derived from small gold imitations of shells which were imported by Portuguese traders into the west coast of Africa, and called by them 'Spondylus macutus.'

Money has been formed of coal and terra-cotta, parts of the human skull and bones, of precious stones and of wood. Articles such as swords, spades, fishhooks, cloth, brass rods, mats, etc., in fact, almost anything useful, have been at some time or other pressed into service as money. Slaves were freely used in Africa before the advent of European civilisation, and were indeed a very sound form of money, for if any untoward accident deprived them of their usefulness for exchange, the holders could, and often did, cash them—in other words —kill and eat them. Pepys speaks of the government tallies—wooden sticks notched to indicate certain sums —then divided into half, one portion remaining with the creditor until the debt was discharged. These government obligations changed hands for very many years as a species of currency. The ease with which debt could be extinguished by the simple expedient of committing to the flames the wooden tallies held by the government appealed successfully to the Stuart monarchs, whose financial methods were none too scrupulous.

Probably coining was practised in China—which claims to possess historical records more than forty centuries old—long before the notion occurred to western nations, but it never attained artistic excellence as an art, nor general circulation in any other medium than copper, and the genius of the Chinese people has not even yet succeeded in creating a simple currency such as western nations have developed long since.

The effective western system evolved naturally from the application of coining to the precious metals. The first efforts to form coins consisted of oval-shaped bullets of electrum—a compound of gold and silver. At that time the relative value of gold and silver was 1 to 13·3, so that, allowing for the composition of electrum, the ratio of electrum to silver was almost exactly 1 to 10.

Some are inclined to believe that electrum was an artificially composed metal, because it was usually of the same relative proportions—namely, 73 per cent. gold and 27 per cent. silver. This does not necessarily follow, for the gold found in different parts of the world varies curiously as to the proportions of pure metal and alloys; so much so that an expert assayer can decide from the result of his assay the quarter whence unrefined gold has its origin. Moreover, silver alone was coined almost as early in the world's history as electrum, and this fact suggests that some means had been found already of separating the two metals. Still, this is not a proof, because the silver used for silver coins might have been derived from silver-lead, that is to say, ore in which gold had no place.

In the time of Croesus, 568-554 B.C., both metals were used for coinage at a fixed ratio, hence it may be said that bimetallism had a most early origin. The Phoenician standard of weight based upon Babylonic measures was as follows :

Talent . .	690,000	grains	. .	3000	staters.
Mina . .	11,500	„	. .	50	„
Stater . .	230	„	. .		

The invention of coins came in the way of natural evolution. Ingots and lumps of the precious metal naturally required to be stamped with the weight and fineness when used as articles of commerce. So as to obviate the necessity of each new owner of verifying the stamp, an official mark came to be imprinted. Further, to prevent disputes, the government acquired a vested right to imprint such official marks.

Some consider that markings upon ingots were first made when the metal was placed in temples for safe custody. The privilege of sanctuary for human beings was of ancient institution—as will be recalled from the setting apart by Moses of 'cities of refuge.' A certain privilege followed with regard to treasure also, and the depositor would naturally court protection from the presiding deity of the temple by imprinting upon his ingots some badge or symbol of the god.

A Roman coin—the denarius—ancestor of our penny, was the subject of the question of Jesus Christ, 'Whose image and superscription hath it?' They answered and said, 'Cæsar's,' and He saith unto them 'Render, therefore, unto Cæsar the things that be Cæsar's, and unto God the things which be God's.' By these words a spiritual truth was imparted based upon the fact that a coin bears a symbol of authority, and possesses indications identifying it with a fixed value for taxation and other purposes. These two details epitomise the object for which coins came into existence.

In course of time the inconvenience of ingots possessing varying weights and the necessity of frequent calculations, led to the adoption of certain fixed weights. In such a way the tola—the ancient weight of India—determined the weight of the rupee—the standard silver coin.

Ultimately it was found that irregularity of surface presented an obstacle to counting, and coins were made so as to pile upon each other in tens or twenties. The circular form was finally adopted as the most convenient to handle. Milling or lettering was then placed around the edge to restrict the risk of clipping—and, in some

descriptions of coins, so as to prevent one coin being mistaken for another. Nickel coins have lately been issued in India. There was some danger that illiterate peasants might mistake the new coins for silver, so the new anna pieces are provided with a wavy edge, which is unmistakable, even in the dark, as it can be recognised by the touch, and there is little risk that even a reveller, who has dined too well, can mistake it for a more valuable coin.

Many experiments have been made to reduce the loss of weight which necessarily attends circulation. The character and the amount of alloy, as well as the style and the relief of the design, enter into the calculation. The composition of most of the silver coin issued up to the present day has been about 900 parts of fine silver in the thousand—the alloy being usually copper.

It will be readily understood how important it is to limit the loss as far as possible, when we are informed by mint authorities that the average life of the design upon a shilling is about thirty-seven to forty years.

Herodotus, who lived about twenty-four centuries ago, stated that 'so far as we know the Lydians were the first to make coins of gold and silver.' He told some fairy-tales as veracious history, but this statement has the ring of truth. The earliest extant Lydian coins date probably from the reign of Syges (about 700 B.C.), and were of a bean shape. The first Greek silver coins were of Aeginetan origin, with the figure of a tortoise upon the obverse, and are said to have been struck by Pheidon of Argos. The tortoise was the symbol of the Phoenician goddess of the sea. Silver is still being produced from ancient Grecian mines which, doubtless, furnished part of the metal for these early coinages, as well as for the images of Diana in the time of Saint Paul, who incurred the enmity of their makers inspired by fear for the destruction of their craft.

The great majority of coins have been of the denomination commonly called dollars, or their fractions. Count Schlick of the thal, or valley, of Joachim in Bohemia, is the godfather of the word dollar, and his

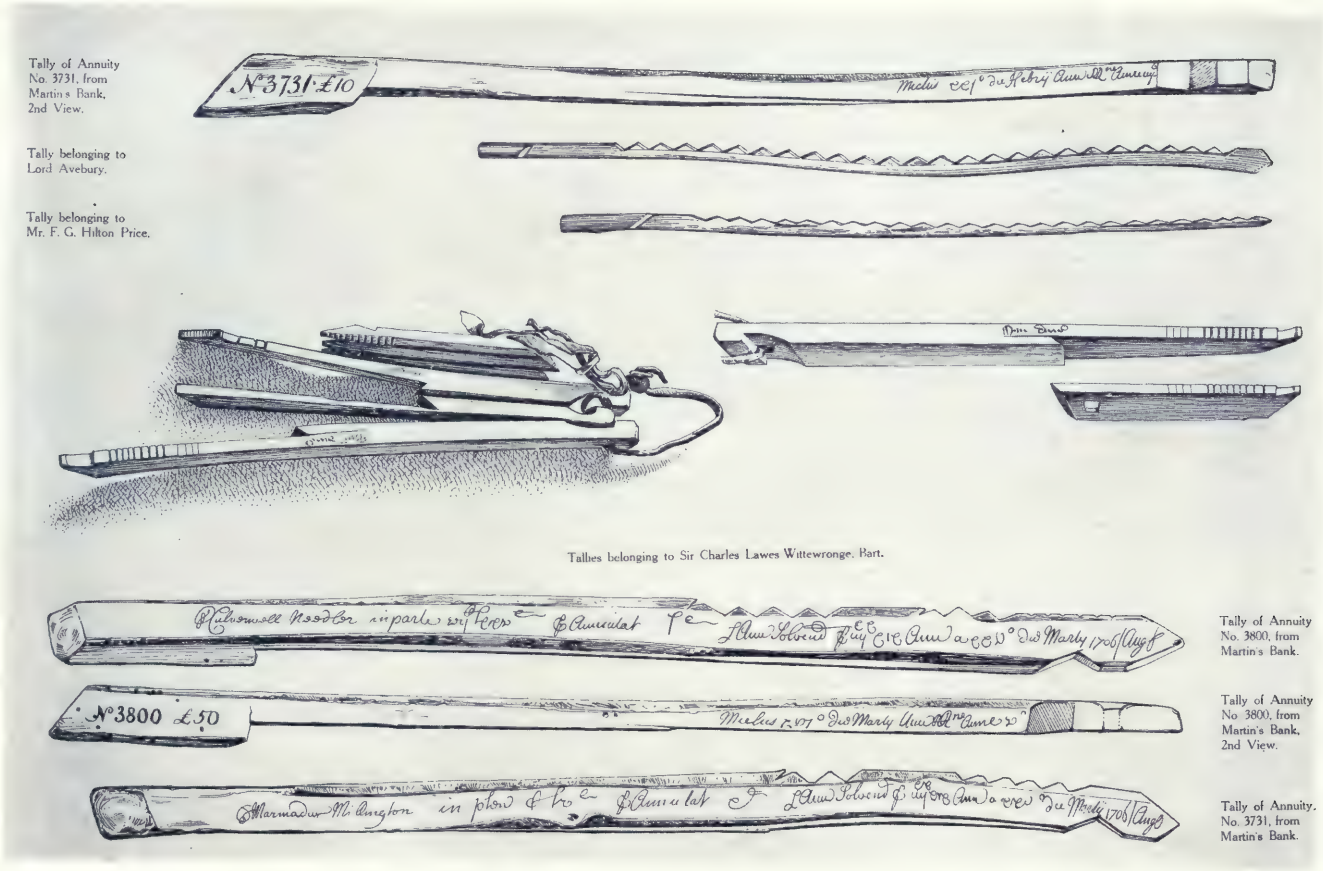
connection with the word arose in this wise. In 1486 A.D., as possessor of silver mines in the vicinity, he obtained authority to set up a mint where large coins were fashioned. These came, in course of time, to be styled Joachimthalers, and by a natural colloquialism became known as thalers. When their use extended to people of other tongues, a further corruption to daler ensued, and finally to dollar. Although there has been no actual coin of that denomination in England, this word has become a colloquial expression for a five-shilling piece. So handy was the coin for commerce throughout the world, that the Spaniards minted pieces of that size out of the immense silver treasure discovered in Mexico and South America, whence they were scattered by traders to the furthest parts of the earth.

When the great United States Republic came into being, the once English Crown Colonies of North America had been long accustomed to the use of the Spanish dollar or piece of eight (reals), and no other form of coin seemed so desirable as a basis for republican currency. By an Act of Congress—8th August 1786—the dollar was adopted as the basis of the new American coinage instead of shillings and pence. The rix-daler of Holland, and the talari of Abyssinia, both betray by their spelling their kinship to the dollar.

The origin of the sign $ for dollar is doubtful. Old accounts used to be kept in Spanish dollars or pesos, and the abbrevation P.S. was used to express these coins. Ultimately the P. was dropped, or perhaps supplanted by a stroke through the S, thus creating the universal sign of dollars. Another suggestion is that the stroke was placed through the figure 8, which appears upon the old Spanish dollar or piece of eight.

Silver coins have been counterfeited even by the issuing authority. An extreme case was when the Mahdi, chafing at the circulation of French five-franc pieces in the territory under his control, cast about for means to produce a coin of trifling intrinsic value, about which he could throw the halo of his authority. Herr Neufeld, who was held prisoner by the Khalifa, and was

rescued after the battle of Omdurman, was expected to manufacture amongst other articles, gunpowder, cartridge cases, and coins. The captive wrote to a friend as follows : 'There is a great need of coins here : up to the present, no one has been able to produce a silver coin resembling a dollar. If I could produce such a coin, it would lead to my release from prison and lend probability to my chances of escape. Could you send me instructions for the simple mixing of any soft metals to produce a silvery appearance, and send me some ingredients? I should like also an instrument to imitate the milling of coins : the dies can be cut here.' Neufeld appears to have been successful in his efforts to produce such coins, for a quantity of silver pieces about the size of a five-franc piece were shipped to London for realisation after the fall of Khartoum. The realised value was only about 3d. each, for the contents were mostly copper, and, as they were forced into circulation in the place of five-francs of the equivalent of four shillings, the venture should have been profitable to the Mahdi's exchequer, but it did not secure the freedom of the unhappy captive, as he had hoped.


Tally of Annuity No. 3731, from Martin's Bank, 2nd View.
Tally belonging to Lord Avebury.
Tally belonging to Mr. F. G. Hilton Price.
Nº3731 £10
Tallies belonging to Sir Charles Lawes Wittewronge, Bart.
Nº3800 £50
Tally of Annuity No. 3800, from Martin's Bank.
Tally of Annuity No. 3800, from Martin's Bank, 2nd View.
Tally of Annuity. No. 3731, from Martin's Bank.

TALLIES.

(*p. 199.*)

CHAPTER XVIII

THE EARLIEST SILVER COINAGE

Derivation of coin—Mirror of the past—None issued in Egypt—What history owes to coins—Records of sculpture—Pedigrees—Portraits——Deification of Alexander the Great—Costumes and architecture—Development of design—Greek beauty never exceeded—Humour on coins—Greek towns—Portrayal of animals and natural objects—Sport—The height of numismatic excellence—Syracusan good taste—Caravans and money—A Phoenician galley—The head of Alexander—First coinage of Rome—Decadence in design—Indian head-dresses—A polo melée—The shekel—Extension of Roman power.

A COIN is defined as a piece of metal made into money by the imposition of an official stamp, cf. coign, Latin 'cuneus.' Upon the long series issued are mirrored faithfully the history of the great past achievements of heroes and of statesmen, and the vast territorial changes which have been witnessed during succeeding centuries. It would have been surpassingly interesting had the invention of coining dated back to those eras, the historical records of which are few or disjointed. The great world empires anterior to the Greek and Roman would have been brought much nearer, if the many familiar details which figure upon coins could be studied with regard to those distant periods. But, as Professor Thorold Rogers remarks :

'There were none in Egypt, in Assyria, in Babylonia, in the old Phoenician colonies; for coins are sure to be lost now and then, and are exceedingly indestructible. None have been found in the ruins of these countries, and yet it appears, from recent research, that Babylonia had an elaborate system of banking, and all the machinery of transferring balances from one account to another.'

A pamphlet issued by the National Bank of Boston well expresses what we owe to this most useful invention :

'As we handle a representative collection of these man-wrought bits of metal there pass before us the faces

of those in whose presence thousands of knees have bent, and for whose coffers millions of now forgotten dead have paid tribute of lives and money. Hundreds of humanity's rulers in counterfeit presentment; their honourable achievements, their assumptions and vanities; the religious faiths that have actuated great nations and caused them to war on others, or to be warred upon; objects the possession of which has given wealth or renown to ancient cities—all this and vastly more has been either portrayed or symbolised upon the world's coinage of the past twenty-six hundred years. The identity of remarkable sculpture has been established, and the shape and posture of the missing limbs of beautiful statues indicated, by reason of their being reproduced on contemporary coinage. Phidias, Myron, Praxiteles were drawn upon to furnish subjects for the coins of Greece. Benvenuto Cellini was proud to lend his great genius to the coinage of Florence. Thousands of great facts in history have found here a lasting record. To be sure, a connected history of the world could not be compiled from extant coins alone, but the existence of such pieces as we have in a well-preserved state enables historians to verify or reject doubtful records and traditions, to fill gaps in many royal pedigrees or lines of succession, and in general to corroborate written statements that otherwise would ever remain somewhat in question.

'Were we obliged to depend wholly on painted portraits for likenesses of kings, queens, and noted leaders of men, such material would carry us back no further than the latter part of the Middle Ages. But on coins and medals we have a series of portraits in relief, in many cases beautifully rendered, running back to 300 B.C., and often showing with unflattering exactness the characteristics of the person represented.

'But no representations of the human head have been found on money until after the death of Alexander the Great (323 B.C.), whose remarkable qualities caused him to be deified and his portrait shown on coins and medals.

'From that time on, portraiture was often employed, and the historian and artist are indebted to this source

for the only known likenesses of Alexander, Ptolemy, Cæsar, Mark Antony, Cleopatra, and many another world-famous person.

'The varying costumes and headdress of two thousand years in many countries may be seen upon coins, and architecture and heraldry are indebted to the art of the coiner for much historic material.

'From a mechanical standpoint the coining methods of the present day are immeasurably superior to those of earlier periods. But in delicacy of sentiment and treatment, in artistic quality and character, we have never surpassed the best productions of Sicily and of Greece—twenty-two centuries ago.'

The development in the design and execution of coins is an attractive study to those who take keen interest in numismatics and also will not fail to interest the reader. It has been by no means a continuous advance, but often retrograde. In recent years, however, some superb specimens have been minted, amongst which those of Great Britain, France, and the United States occupy an honourable place. There have been periods, however, in the world's history, dominated by a lack of artistic enterprise and even by bad taste, and no pieces ever struck excel in design those issued a few centuries after the invention of coining, which happened to be the best period of Greek art, as to artistic beauty, finish and animation.

Authorities divide the earliest periods thus :

I.—Circa B.C. 700-480.	*Period of Archaic Art*, ending with the Persian wars.
II.—Circa B.C. 480-400.	*Period of Transitional and Early Fine Art*, to the end of the Athenian supremacy.
III.—Circa B.C. 400-336.	*Period of Finest Art.* Age of the Spartan and Theban supremacies.
IV.—Circa B.C. 336-280.	*Period of Later Fine Art.* Age of Alexander and the Diadochi.
V.—Circa B.C. 280-190.	*Period of the Decline of Art.* Age of the Epigoni, etc.

VI.—Circa B.C. 190-100.	*Period of continued Decline of Art,* Age of the Attalids.
VII.—Circa B.C. 100-1.	*Period of late Decline of Art.* Age of Mithridates the Great and of Roman dominion.

The coins struck in the first period were mostly of a rough circular shape—often of lozenge form, and rounded like a bean. A curious feature was the repetition of the design upon the reverse, sunk instead of in relief.

Frequently there was an obvious attempt at jocularity. A coin of Euboea exhibits this whimsical peculiarity. A lady's head, not at all unpleasing, though reputed to represent that of a gorgon, greets the eye with a rollicking smile, and a tongue outstretched to somewhat indecent limits. The reverse shows a bull's head—probably alluding to the name of the island.

The practice of thus linking the name of the issuing authority with the coin was not infrequent, and patronal deities whose name had been assumed by the town or state from which the coin originated figure often in the design. The town of Posidonia, for instance, circulated money adorned with a figure of Poseidon, nude but for a chlamys across his shoulders, wielding a trident with great vigour. This coin is very finely executed; the reverse shows the same design sunk instead of in relief.

Another noticeable practice of this period is the portraiture of animals, feral or domestic, and also emblems of agriculture. Sybaris possessed a coin showing a powerful representation of a bull, indicative, possibly, of the unexampled prosperity enjoyed by that locality, until destroyed by Croton. Metapontum, famed for its agricultural fertility, delighted to honour the source of its prosperity by a beautiful design, the centre of which was a full-grown ear of wheat.

The second period was that in which Athens attained the zenith of its power, and thus secured great popularity for its coins in the marts of the then known world, both on account of their fineness and weight. Designs about this time exhibit a keen appreciation of sport—

in the modern sense of the word. Figures of athletes and of hunted animals are depicted, but enthusiastic golfers no doubt deplore that the Greeks of that period did not indulge apparently in that ancient game. The details of the several designs are often very realistic. A coin of Samos shows a lion's head, viewed as from above, which for draughtsmanship could not be excelled at the present day. Coins were sometimes topical. Alexander I. of Macedon celebrated his capture of the Bisaltian silver mines in 480 B.C. by an issue of coins displaying a steed with a warrior seated upon the off side, holding a couple of spears in his hand. In the first two periods the range in weight of the coins was very great, namely—

First Period	. .	38 to 624 grains.
Second „	. .	208 to 685 „

During the third period, it is considered that numismatic art reached an excellence which has never been exceeded. No one who sees the coin weighing no less than 669·1 grains, issued by Syracuse, needs to be an expert to know that he is looking upon a veritable triumph of skill and good taste. The name of the designer, Euainetos, is worthily borne by the coin. The obverse bears the head of Arethusa, perfect in profile, and of a pleasing dignity in expression, whilst dolphins swim gracefully around the edge like a frame. The reverse shows a quadriga, elegant in proportion and detail, with a figure of Nike crowning the victor in the chariot. The space beneath contains armour so disposed, with the design above, that the surface of the die presents a harmonious whole. This coin, as well as another coin of slightly heavier weight, issued by Syracuse in the preceding period, obtained a wide circulation along the caravan routes which formed the avenues of trade, and travelled probably as far as the Euphrates and the Tigris. Nor need one be surprised—the coin is a joy to look upon. Execution of such delicacy was impossible of forgery, and the status of the issuing city guaranteed the quality and weight of the coin, and the bulk was substantial. Coins of large size were

always useful for the payment of round sums to be made at a distance, and by their size protected the owner from petty pilfering, and were easy to count. The Maria Theresia dollar—still coined from the ancient die, dated 1780, of exceptional weight, nine-tenths of an ounce, and bearing one of the most beautiful designs extant, still circulates around the Red Sea, and frequents the caravan routes that radiate from its shores. Thus the same considerations govern the mintage of coins in the fourth century before, as in the twentieth century after, the Christian era.

The third period indicated a predilection for heads, male and female, in which the eyes are modelled naturally, not conventionally, and the face is not confined to a side view, but often is shown full.

The Phoenician city of Sidon denoted with pride the origin of its success by striking a coin weighing 425 grains, depicting a Phoenician galley under full sail, but the workmanship will not bear comparison with Grecian art. Indeed, the designs of Eastern coins were distinctly inferior to those from the opposite shores of Europe. The Greek cities of Ephesus, Samos, Chios Cos, and Rhodes supplied most of the silver currency for the world at that epoch.

The fourth period, 336-280 B.C., was that of Alexander the Great and his immediate successors in power. Naturally, centralisation of authority reduced the number of coins emanating from cities. The designs were in rather full relief, and the faces represented are full of expression. Long after the death of Alexander, coins were struck with similar heads to those used in his reign. Rhodes issued a very beautiful coin during this period, probably just after the great siege of that city in 304 B.C. Almost full face to the beholder, a handsome head with massive locks of hair, supposed to be that of the Colossus, is represented, and behind are indicated the rays of the full-orbed sun.

Ptolemy Soter was the first ruler to place his own head upon his coins, not as the mere semblance of a Greek divinity, but with his own features and a royal diadem.

The fifth period, 280-190 B.C., shows the predominance of Athens as the principal place of mintage. Rome first coined silver in 268 B.C., and other Italian towns then ceased to mint, with the exception of Tarentum, which exercised the right until 201 B.C. Carthage coined freely, and her dodecadrachms, with a head of Persephone on one side and a horse on the other, weighed no less than 700 grains. These pieces compare unfavourably in execution and design to the beautiful large coins to which attention has already been drawn.

A coin of Syracuse struck during this period shows an elegant presentment of a lady, whose handsome features are supposed to be those of Queen Philistis, the wife of Hiero.

About this time belong the earliest coins of India, which possess an interest peculiarly their own, owing to the striking appearance of the head-dresses of the figures imposed. Grecian and Roman coins show the head usually bare, with the exception of those pieces graced with the head of Minerva or Poseidon, whose characteristic helmets are a well-known feature in art generally. The obverse of a coin of Demetrius represents him as wearing a head-covering formed of an elephant's head with tusks pointed, and trunk uplifted toward the front. The reverse of this coin shows a nude Hercules with his club, and his chlamys like a bath-wrap draped upon his arm. Antimachus appears upon the obverse of his coins in an exact facsimile of a flat Scotch cap minus the tassel. On the reverse is to be found Poseidon holding what seems like a toasting-fork of prodigious dimensions. A coin of Eucratides possesses a design singularly up-to-date. On the obverse his effigy wears headgear exactly like a modern sun-helmet, and on the reverse there is shown a scrap between two horsemen which may well pass for a polo mêlée. The designs upon the coins of Ptolemy II., 285-247 B.C., are notable for the inclusion of the two deified heads of his predecessors, Ptolemy I. and his Queen Berenice. It was quite an innovation to impose the heads of two reigning sovereigns upon one face of a coin.

The sixth period, 190-100 B.C., is noteworthy for the privilege conferred upon Simon Maccabaeus by Antiochus VII., to issue in Palestine a coined shekel bearing the inscription—'Shekel of Israel' and 'Jerusalem the Holy.' Athens continued to pour out coins upon an exceedingly large scale, being no doubt assisted by the plentiful supply of silver from her mines, and by her trade with the East through the market at Delos. In Italy the Roman Government preserved the right of mintage, as an appanage of the State alone.

The seventh period, 100-1 B.C., exemplifies the rapid extension of the Roman power, and is not distinguished for merit in design or execution ; on the whole, with the exception of the coins struck in Asia, there is an evident decline from an artistic point of view.

It is a remarkable testimony to the excellence of craftsmanship during the first few centuries after the invention of coins, that their value as an assistance to trade between civilised nations does not immediately strike the attention.

A SYRACUSAN MASTERPIECE AND A GROAT OF HENRY VIII. (*p. 207.*)

CHAPTER XIX

LATER DEVELOPMENTS OF COINAGE

Utility succeeds art—Unified Roman currency—Luxury and decay—Ratio between gold and silver—Filling the Exchequer—Sufferings of the people—Difficulty of reform—Early British coiners—Offa's silver coin—Lundonia—Ecclesiastical privileges—Saxon coins at Copenhagen—Groats—Silver payments by weight—Coins of account—Debased currency—Henry VIII. unscrupulous—'Bagging' monastery treasure—The historian's gibbet—The Crown's gibbet—Trial of the Pyx—Maundy money—Good silver, bad money—Robinson Crusoe—Ticals.

THE next page of history to that touched upon in the preceding chapter reveals the darker side of coinage, the period when utility began to succeed beauty, and when the base coiner was to be found, not only in the lowest but also in the highest scale of society, in the ranks of those whose public duty it was to safeguard the intrinsic value of the very coins which they abased.

From the time of the conquest of Greece to that of Augustus, 27 B.C., both Greek and Roman money circulated in the East, and large payments were made by weight. This became a necessity owing to the varying size of the coins, although the impression of a die was still valuable as a guarantee of weight.

In the reign of Augustus a unified monetary system was imposed upon the Roman Empire. The basic coins were the aureus, of which forty were coined from a pound of gold, and the denarius, of which eighty-four were coined from a pound of silver. The institution of uniform coinage under the aegis of the Roman Emperor, in substitution for coins of varying weights and qualities, was naturally a worthy ideal. But the placing of coining authority in the hands of an autocrat brought about a position of temptation, and, as the Roman Empire grew in luxury and fell into decay, the standard coins were deteriorated in weight and quality. The first step in depreciation of the coinage was taken by Nero.

The ratio between gold and silver had been 1 to 12, but by issuing denarii below the nominal standard, he reduced the ratio 1 to 10·68. This easy process of replenishing the Imperial Exchequer was followed by many of his successors, who increased the extent of the alloy until the time of Severus, 193-211 A.D., twenty-five denarii, which should have contained 1320 grains of pure silver, only contained 670. This did not terminate the abandoned career of the standard coin, for, under the Emperor Gallienus, 260-268 A.D., the argenteus, which had replaced the denarius, consisted of base metal, merely washed over with silver.

The evil condition of the people owing to these malpractices on the part of the Government was severe. Taxes were exacted in gold, but the debts of the Imperial Treasury were discharged in these subterfuges for money, at twenty-five to the aureus. The gold had to be purchased, probably from the agents of the State, at a tremendous premium, sometimes as high as five hundred or more base denarii for an aureus.

Aurelian, 270-275 A.D., attempted a reform, but so great were the power and wealth of the moneyers and interested parties, that there was a dangerous revolt, which cost the army seven thousand men before it was suppressed. Changes in the style, weight, and quality of the standard silver coin of the Roman Empire occurred from time to time, but, probably because of its relative scarcity, gold and copper seemed to predominate in the currency.

The ignorance of early British coiners in ante-Saxon times, as to designing, or their desire to attain spurious currency for their coin, led them to imitate foreign dies. There are in existence curious imitations of the gold stater of Philip II. of Macedon. It requires the strongest imagination to detect in the weird collection of legs and waving hair, the chariot horses which graced the reverse of the original design.

The prevailing coinage in Saxon England was of silver. In many cases the types seem to have been derived from Latin coins, and the engraver often bungled the

inscription owing to his lack of understanding the Latin which he copied. Small silver coins were struck in England as far back as the reign of Offa, King of Mercia (757-796 A.D.). This king is credited with the introduction of the British penny. From Mercia, or Kent, the cult of the penny spread to East Anglia and also to Wessex. Some of these early coins bear the word 'LUNDONIA,' from which the present name of the world's metropolis was derived.

A great number of coins appear to have been struck by archbishops and other ecclesiastical dignitaries, and to have been inscribed with the names of sundry saints, such as S. Edmund, S. Martin, S. Andrew, and S. Peter —the reference to the last saint is apposite, seeing that our Lord addressed him with regard to the payment of tribute money. In this connection it may be noted that a collection is made and remitted yearly to the Pope of Rome, entitled Peter's Pence. The selection of clergy for mint-masters is not surprising, for scientific learning was confined largely to the religious houses of those days.

The finest collection of early Saxon coins is to be found at Copenhagen. The reason is remarkable. Probably the bulk of the minted Saxon coin found its way to Denmark as 'danegelt,' the tribute exacted from the unprotected and unwarlike dwellers on the British coast, who bought off the fierce invaders from over the sea with their available cash. No bills payable six months from date suited these hardy Vikings. The ransoms proved so tempting that visits were far from infrequent, and always costly.

These early coins were divided when smaller coin was desired—hence the term half-penny, and farthings (fourthings). The change from Saxon to Norman rule made little alteration in the type of the coins, and a tendency set in to eliminate elements of variety, until a strict uniformity as to the silver coinage was attained in the reign of Edward the First, and lasted for the succeeding two hundred years. It was in this reign that groats, equal to fourpence, were first issued.

Professor Thorgold Rogers became convinced, by some

ingenious investigations which he carried out, that for a long period in English history it was the weight, not count of coin, that was used for payment. He states: 'Now the conclusion which I arrived at, and that many years ago, was that payments were made by weight, and not as now by tale, that whatever was the weight of the pieces issued by the Mint, a man who covenanted to receive or pay a pound of silver, for goods, services, or dues, received 5400 grains up to 1527, and 5760 afterwards, and that this system lasted from the earliest records down to the restoration of the currency under Elizabeth.

'Those Teutonic nations which were never brought under the direct influence of the Roman administration had a unit of money which they called a mark. Those parts of Western Europe which were brought under the direct administration of Rome had a unit which they called the pound, livre, lire. Sometimes, as in England, the two systems were used in calculations, and in early times quantities were expressed in marks almost as frequently as they were in pounds. From a very early date the mark was reckoned at two-thirds of the pound. Neither the pound nor the mark was ever coined. They were simply money of account. Moreover, the only currency employed in circulation for a long time was silver, and in many countries silver remained the only currency till very recently.'

In the reign of Henry VIII. the quality of silver coin was reduced to one-third fine silver and two-thirds alloy. The evil results of a debased coinage were removed in 1662 A.D. by a return to the old standard, which has remained in use until the present day.

Professor Thorold Rogers rightly nails false or debased coins to the counter. Dealing with one of the greatest offenders, he states: 'During the whole of English history, there never was a sovereign so outrageously and wantonly extravagant as Henry. He inherited an enormous fortune from his thrifty father, as fortunes in the sixteenth century went, and dissipated it speedily.

'The smaller monasteries went, and he soon came to an end of their accumulations. The larger ones he spared, declaring them to be the seats of piety and religion. He pledged himself that, the spoil of the monasteries given him, he would ask his people for no more taxes, not even for necessary wars. Soon the greater monasteries went. I believe that, foreseeing the storm, the monks had granted long leases of the lands, so that much of his plunder was reversionary. But the accumulated treasures of ages came into his clutches. A long array of waggons carried off the gold, silver, and precious stones, which for nearly four centuries had accumulated round the shrine of Becket. This shrine was no doubt the richest in England, perhaps in Christendom. But there were others more ancient and nearly as wealthy, at Winchester, at Westminster, at a hundred sacred places. It is exceedingly probable that the accumulations of these holy places were, as bullion, equal to all the money in circulation at the time. He began to issue base money, at first with very little alloy beyond what has been customary. He soon became shameless, for his mint kept issuing baser and baser coins. He is the only English sovereign who has ever committed this mean and treacherous crime, for Charles only thought of it. Most of us are accustomed to consider the coiner of base money as a peculiarly scoundrelly criminal, because the success of his calling depends mainly on his being able to cheat the poor. Except by the magnitude of his crime, Henry is on a level with the meanest of knaves. The crime is heightened by the fact that it is the first duty of a ruler to keep the currency up to standard. Such men as our Henry the Eighth, and such men as Ernest of Saxe Coburg, who was, I believe, the last European sovereign who issued base money, and repudiated it, ought to be gibbeted in history.

'In other European countries despotism has played fast and loose with the currency. The pound was the unit in France as well as in England. The late currency of Elizabeth reduced it to a third of its ancient and traditional value. The French livre is, now under the

name of franc, one seventy-second part of its original value. In Scotland, which was a despotism tempered with assassination during the reigns of the earlier Stuarts, it sank to a twentieth. But I think it would have been dangerous had any English monarch played the pranks which John the Good, as they called him, in France did.'

Hollinshed describes the severity exercised toward offences against the coinage laws. In the year 1569 he writes : 'Philip Mestrell, a Frenchman, and two Englishmen were draune from Newgate to Tiburne and there hanged; the Frenchman quartered who had coined gold counterfeit; the Englishmen, the one had dipped silver, the other, cast testons of tin' (Hol. iii. 1211). Although the authorities deemed it no crime on their own part to debase currency, it is evident that they had no qualms in acting vigorously to prevent the public from sharing in their wrongdoing.

With the accession of the Tudors, the portrait of the reigning sovereign began to decorate coins for the first time. In the latter part of the reign of George III. the currency fell into a very indifferent condition, and in order to provide silver money, the expedient was adopted of counterstriking Spanish dollars.

The following account of the method adopted to secure the absolute conformity of the coinage to the standard is taken from Cripp's *Old English Plate.* The important duty of testing it from time to time has been entrusted for ages to the Goldsmiths' Company. The ceremony has been conducted with the same formalities, and is called the trial of the Pyx. Such a trial is known to have taken place in the ninth and tenth years of the reign of Edward I., and it has been held at short, but irregular intervals, until, in modern days, it has become an annual event.

A specimen coin, taken formerly from each journey or day's work, but at the present time from each melting of metal whether gold or silver, is placed in a chest kept at the Mint, called the Pyx. At the proper time, a jury of the Goldsmiths' Company is summoned, who, after

being sworn and solemnly charged, proceed to an assay of the coins found in the Pyx, and to compare their quality with the standard trial plates in the custody of the warden of the standards. Their verdict is the deliverance of the authorities of the Mint, who are virtually placed upon their trial.

Since the Coinage Act of 1890, the proceedings have been somewhat shorn of their circumstance, owing to the jury being summoned to Goldsmith's Hall, and there charged by the King's Remembrancer instead of by the Lord Chancellor himself at Westminster, where the assay was formerly conducted in an apartment prepared specially for the purpose.

For the purpose of presentation, a number of silver pence, twopence, and fourpence pieces are minted specially, and, together with pieces of threepence, are given by the Royal Almoner on Maundy Thursday to as many poor men and women as the years of the sovereign's age. It is not generally known that Maundy money became legal tender by the Act of 1870.

Owing to the intrinsic value of British and most other silver coin being less than the nominal value, it is a profitable though dangerous practice for false coins to be made illegally out of good silver. The work is sometimes done very skilfully, and the die is usually prepared from coins chosen because they have had considerable wear. They are very difficult for the public to detect, but a practised eye perceives that the lettering is larger than in a sound coin. The reason for this is that a mould taken from a good coin cannot be so accurate in the finer details as an original die.

The piece of eight (reals), which is so familiar to readers of *Robinson Crusoe*, was originally of rude manufacture. A coarse die, the design of which included a cross, was imposed upon an irregular piece of metal, and the result was useful, though hardly ornamental.

The old silver currency of Siam ranks amongst the most curious-shaped coins of the world. These ticals, as they were termed, in denomination from one upwards, were not unlike small tiny ingots bent so as to fold together.

CHAPTER XX

SILVER IN LITERATURE

Proverbs—Joseph and his brethren—The greatest drama of all—The spinal cord—No silver in Heaven—Bunyan and the company promoter — Shakespeare and impecuniosity — A wily broker — The celebrated Long John—Pepys and his tankards—Lost coins—Mark Twain's proverbs—The burglar's smile—Xenophon and metallic agriculture—Pliny's derivation of 'metal'—Archimedes and his bath —Hired at £300 a day—Silver statues—Silver in painting.

THE name of any article in constant use cannot fail to find its way into the common speech of the people. If, as has been asserted, the vocabulary of an unlearned peasant consists of only a few hundred words, silver is sure to form a part wherever the metal is to be found, either as ornament, domestic utensil, or as money. The learning of the illiterate is manifested in their proverbs. By many an apt and piquant phrase the homely wit of some nameless author of a bygone age has been immortalised upon the lips of succeeding generations, and has been handed down to point a moral or adorn a tale, long before the written or printed page came into existence. Thus we are told that speech is silvern but silence is golden. A two-edged sword by the way! for a conception of the whole world as one vast Trappist monastery is far from pleasing. Golden it might be, but as painful to the sense as the realisation of the wish of King Midas, portrayed so charmingly by Hawthorne in the *Tanglewood Tales*. But who that has listened entranced to the silver tongue of a Gladstone or a Spurgeon would question the fitness of the qualification?

It is said of one placed from his birth in favourable circumstances, that he was 'Born with a silver spoon in his mouth.' The idea is conveyed that life as a whole has been dished up, as it were, in an agreeable fashion. The pills of childhood were sugar-coated—the thorny

path of learning was not fenced in with birches—the means of livelihood were assured without a wearisome exercise of energy or brain power, and even the feeblest evidence of capacity met with the prompt approbation of admiring relatives and friends. In fact, the procession from cradle to the grave was to be as smooth and pleasant as the touch of a silver spoon conveying food to the lip. The cult of the silver spoon has been prolific in prigs. It is well for many that they had to face the hard facts of life in childhood. Great-souled men like Lincoln have had their characters refined and moulded in the school of adversity.

The proverb that 'Every cloud has a silver lining' derives its significance from the lustrous sheen so characteristic of this metal. The contrast between the soft radiance above and the dense gloom beneath has often sent a gleam of hope to save a sufferer from despair.

The collection of sacred books, the work of different writers at widely different periods, known as the Bible (or library) teems with allusions to silver. Elsewhere attention has been drawn to some of these which have a bearing upon its history. In this chapter, where the subject is viewed from a literary or artistic standpoint, other references deserve a place.

We read in the touching drama of Joseph—perhaps the most human and soul-stirring piece of writing in the whole range of literature—that it was for twenty pieces of silver that Joseph's jealous kin sold him into exile, and that it was by means of a silver cup, secreted within their sacks of corn, that Joseph found a way to stir their sleeping consciences.

Again, when we turn to the greatest drama of all, that which has been taken as the central point from which to measure time, and has changed conditions upon the whole surface of the globe, it was thirty pieces of silver for which the false follower sold his Master, and which afterward, in the throes of remorse, he flung at the feet of his priestly traffickers.

The sweet and solemn passage in Ecclesiastes xii. vibrates through the soul like the chords of Chopin's

'Funeral March,' as it deals in poetic phrase with the close of life. 'Or ever the silver cord be loosed . . . then shall the dust return to the earth as it was, and the Spirit shall return to God who gave it.' The surgeon tells us that the snapping of the spinal cord, the silver-white ligature which connects brain and limbs, brings final insensibility to the form, once full of life.

When the Apocalypse uplifts the veil of a life beyond the grave, it is strange to find that amid all the wealth of imagery employed to describe Heaven, the gates of Pearl, the streets of Gold, the jewelled foundations of the City, and the glistening attire of its fortunate inhabitants, silver does not find a place. Whether the writer recalled its association with the price of blood, and regarded it as under a curse, we cannot tell. Perhaps the liability of silver to corrosion from exposure to the air or chemicals may have deterred the writer from intruding it within a picture fraught with suggestions of what is everlasting and imperishable.

Bunyan makes mention of silver very seldom. Many who allude to religion walking in silver slippers are not aware that they owe the phrase to the prince of allegorists. Though not what may be described as a man of the world possessing a knowledge of business life, he showed shrewd common-sense as to dabbling in silver-mines (which has been the ruin of many) in the following colloquy:

'Then I saw in my dream that a little way off the road over against the silver-mine stood Demas (gentleman-like) to call to passengers to come to see, who said to Christian and his fellow—"Ho! turn aside hither, and I will show you a thing."

'CHRISTIAN. "What thing so deserving as to turn us out of the way to see it?"

'DEMAS. "Here is a silver-mine, and some digging in it for treasure. If you will come, with a little pains you may richly provide for yourselves."

'HOPEFUL. "Then let us go see."

'"Not I," said Christian, "I have heard of this place before now, and how many have there been slain, and besides that, treasure is a snare to those that seek it, for it hindereth them in their pilgrimage."'

The qualification of 'gentleman-like' fits the company promoter like a glove.

Allusions to silver in the plays of Shakespeare are surprisingly scanty. Historians of Elizabethan times record the plentifulness of the metal, yet in most of the plays the word is not even to be found. References are most frequent in *The Merchant of Venice*, the plot of which turns upon avarice. Indeed, it is the only play in which a silver article—a casket—forms a necessary item amongst the properties.

The cause of this indifference is obscure—whether it arose from the simplicity of the stage setting, or that the plots or wording of the plays had their origin prior to the discovery of America, or whether the habitual improvidence of the players rendered such references painful, is not clear. Maybe the latter, for the allusions occasionally contain a strain of contempt, suggestive of the fox and the grapes. Thus, when Imogen offers payment for her uninvited meal, she is met with the words, 'Money, youth? All gold and silver rather turn to dirt, and 'tis no better reckoned but of those who worship dirty gods.' We have no reason to believe, however, that Shakespeare was disposed to make admission free to his theatre, even to the gods.

The surpassingly quaint collection of Eastern tales, known as *The Arabian Nights*, refers to silver money in such a casual way as to suggest that its use was of common occurrence in the days there chronicled. The following is from 'The Story of the Christian Broker' (Lane's edition):

'Know, O King of the age, that I came to this country with merchandise, and destiny stayed me among your people. I was born in Cairo and am one of its Copts, and there I was brought up. My father was a broker: and when I had attained to manhood he died, and I succeeded to his business; and as I was sitting one day, lo, a young man of most handsome aspect, and clad in a dress of the richest description, came to me riding upon an ass, and when he saw me, saluted me: whereupon I rose to him to pay him honour; and he produced a handkerchief

containing some sesame, and said, "What is the value of an ardeb of this?" I answered him, "A hundred pieces of silver." And he said to me, "Take the carriers and the measurers, and repair to the Khan-el-Gawalee in the district of Bad-el-Nasr; there wilt thou find me." And he left me and went his way, after having given me the handkerchief with the sample of the sesame. So I went about to the purchasers, and the price of each ardeb amounted to a hundred and twenty pieces of silver; and I took with me four carriers, and went to him. I found him waiting my arrival; and when he saw me he rose and opened a magazine, and we measured its contents, and the whole amounted to fifty ardebs. The young man then said, "Thou shalt have for every ardeb ten pieces of silver as brokerage, and do thou receive the price and keep it in thy care. The whole sum will be 5000, and thy share of it 500, so there will remain for me 4500, and when I shall have finished the sale of goods contained in my store rooms, I will come to thee and receive it." I replied, "It shall be as thou desirest," and I kissed his hand and left him. Thus there accrued to me on that day 1000 pieces of silver, besides my brokerage.'

So many hours of our boyhood passed rapidly as we perused *Robinson Crusoe*, that the very mention of pieces of eight—the irregularly shaped silver coin familiar to Defoe—revives many pleasant memories.

Turning to more modern fiction, few stories about lost treasure and its recovery possess such consuming interest as that which holds the reader of Stevenson's *Treasure Island* from the first page to the last. We hear an echo of the buccaneer's ominous song:

> 'Fifteen men on the dead man's chest,
> Yo, ho, ho, and a bottle of rum;
> Drink and the Devil had done for the rest,
> Yo, ho, ho, and a bottle of rum'—

and we can all recall the fine mixture of treasures in the sea-chest of Billy Bones. 'A quadrant, a tin cannikin, several sticks of tobacco, two brace of very handsome pistols, *a piece of bar silver*, an old Spanish watch.' If

ever a super-scroundrel has been drawn to the life, it was Long John, whose surname, it will be remembered, was Silver.

One of the most entertaining books to a student of life and manners, as well as of psychology, is the *Diary* of Samuel Pepys, who, though a man of ability and activity in the public service, will be best remembered by his foibles, recorded by himself in writing, which he fondly hoped was his own secret cipher.

The great pride of Pepys' early days was the brace of silver tankards which adorned his sideboard, given by his business friends in grateful memory of profitable deals with the State, through the intermediary of Pepys, in his capacity of Clerk to the Admiralty. An entry under 24th July 1660 reads: 'This morning my wife in bed tells me of our being robbed of our silver tankard' (evidently his first), 'which vexed me all day for the negligence of my people to have the door open,' and ends with that spice of malice essentially Pepysian, 'I hear that my man will have lost his clock with my tankard, at which I am very glad.'

Under date of 21st July 1663, he invites us to share his joy: 'Comes Nicolas Osborne, Mr. Gauden's clerk, to desire of me what piece of plate I would choose to have of £100 or thereabouts bestowed upon me, he having order to lay out so much. I a great while urged my unwillingness to take any, not knowing how I could serve Mr. Gauden, but left it wholly to himself: so at noon I find brought home in fine leather cases a pair of the noblest flaggons that ever I saw all the days of my life: whether I shall keep them or no I cannot tell.' He evidently did find a way to serve Mr. Gauden, for we read under 19th October: 'Weighed my two silver flaggons at Stevens's, they weighed 212 oz. 27 dwt., which is about £50 at 5s. per oz., and then they judge the fashion to be 5s. per oz. more: nay, some say 10s. an ounce the fashion. Sorry to see that the fashion is worth so much and the silver come to no more.' The fact was that plate went frequently into the melting-pot in those unsettled days, when the Crown happened to have special need of coin.

The state of excitement into which the Diarist ran, when, after taking infinite care to save his valuables from the Fire of London, he nearly came to grief, is very amusing. He instructed his father to bury the treasure in the garden at Brampton. He was extremely disgusted to find when he went down to disinter it, that the old gentleman had forgotten in what part of the ground he had buried the treasure. After several anxious searches after dark in fear of prying neighbours, he recovered all except a few coins. An interesting sequel occurred a few years ago. Some silver coins of the early seventeenth century were found in garden ground close by the site of Pepys' family property; probably these formed part of the hoard.

Mark Twain quotes a proverb full of common-sense in *Innocents at Home*, and deals with it in such a way as to suggest the notion that some personal experience pointed its application. 'The Spanish proverb,' wrote he, 'says it requires a gold-mine to run a silver-mine,' a pithy and true saying! 'A beggar with a silver-mine is a pitiable pauper indeed if he cannot sell.' The tendency of silver veins to fail suddenly, and the great expense of development involved by tunnels and shafts, imperative to pursue even the most slender lode, have brought many an enthusiastic miner to ruin. It is the extensive mine, carried on with abundant capital and free expenditure upon plant, which pays well in the long run.

Another view of silver was touched upon by Horace in Book IV. ii. 6, of his *Odes*. 'Ridet argento domus,' cried the poet. Ah! it is a merry life indeed when money is plentiful. 'The house laughs with silver.' The canny Scot, however, does not find joy in the spending, but rather the possession of silver. 'Awfu' place Lunnon! mon, I hadna been there half an hour when bang went saxpence!' (*Punch*.) Of course Horace may have referred to the brilliant reflections from polished silver-plate. There are two sides to that as to most things, and often the burglar enjoys a heartier laugh over the silver than the original owner ever had.

Xenophon, in his essay upon the revenues of Athens,

discourses wisely in regard to the silver-mines of that city. 'There is land of such a nature that if you sow it does not yield crops, but if you dig it nourishes many more than if it had borne fruit.' In other words, use the fertile hills and valleys for crops, and work gloomy ravines and sterile mountains for their mineral wealth.

Pliny gives an ingenious explanation of the derivation of the word metal. 'Silver is found in nearly all the provinces, but the finest of all in Spain, where it is found in the barren lands and in the mountains. Wherever one vein of silver has been found, another is sure to be found not far away. This is the case of nearly all the metals whence it appears that the Greeks derived μεταλλα (with others). It is wonderful that the shafts begun by Hannibal in Spain still remain, their names being derived from their makers. One of these, at the present day called Baebels, furnished Hannibal with 300 pounds weight of silver a day.' These workings are supposed to be near Cazlona by Linares.

Vitruvius tells the story that Hiero, King of Syracuse, asked Archimedes to tell him whether a crown made for him was pure gold, or whether it contained some portion of silver. Archimedes is said to have puzzled over it until he noticed the increase in water-level upon entering his bath. Whereupon he determined the matter by immersing bars of pure gold and pure silver—presumably of equal weight—and ascertaining how much water was relatively displaced, and he thus incidentally discovered the specific gravity of the two metals. Again he wrote: 'But we cannot but feel surprised that the State, when it sees many private individuals enriching themselves from its resources, does not imitate their proceedings, for we heard long ago indeed, at least such of us as attended to these matters, that Nicias, the son of Niceratus, kept a thousand men employed in the silver-mines, whom he let on hire to Sosias of Thrace, on condition that he should give him for each an obolus a day, free of all charges, and this number he always supplied undiminished. One thousand oboli would equal 23 ounces of silver, so that at modern prices the sum

would equal about £3 a day—allowing for the greater purchasing power in those days, perhaps equal to £300 a day.

Plutarch, in his Life of Nicias, declared him to be worth 100 talents, or about 83,700 ounces of silver, a fortune, calculated in modern purchasing power, of over a million sterling.

Cicero writes of a shipload of wrought and stamped silver, indicating two distinct methods by which the articles had been fashioned.

Pliny, in *Ep.* iii. 1-9, describes suppers as served upon pure and antique silver.

Silver has been frequently employed for modelling statues. The bitter outburst of the craftsmen of Ephesus, headed by Demetrius, when their industry became in danger through the preaching of Paul, show the importance of the trade.

Painters are well aware of the charming contrast afforded by placing a silver object in contrast to blue, and readers will recall at once the beautiful picture of the 'Assumption of the Virgin' by Murillo, where the blue robes of the central figure surmount a silver moon, emblem alike of purity and heavenly exaltation.

AN INDIAN BAZAAR SCENE. (*p. 223.*)

CHAPTER XXI

DOMESTIC USE IN INDIA

A disappearing stream—Ancient highways—Wars and rumours of wars—Fettered limbs—Express news—Industrial consumption—Numbers count—The monsoon and births—Marriage customs—A silver hedge — Bejewelled bullocks — Silvered shrines — Decorated deities—Enamel-work—Glassware—Sivami plate—Shawl patterns—Damascening—Burmese silver-mines.

SILVER plays a most important part in the life and customs of the vast aggregation of dusky complexioned peoples who inhabit the great Indian peninsula. Ever since the discovery of the vast deposits in South America by the Spaniards, the nations of the East, especially India, have attracted a glistening stream of precious white metal, which, in the very act of flowing, has disappeared as imperceptibly as a cliff rivulet sinks into the sands of the seashore. Its ultimate home remains an interesting theme of speculation.

Other movements during the course of the past centuries have been concurrent with that of silver. Across the Himalayas, lifting their snowy heads above the parched heat of the plains, are steep passes, sometimes piercing the clouds as high as eagles' eyrie. These paths are numbered amongst the most ancient highways that the foot of man has ever trod. Imagination fails to picture the myriad feet which have paced these tracks during the many thousand years of long-forgotten history: caravans of camels piled with merchants' goods, pilgrims beyond count, lowly herdsmen driving their flocks of goats or kine, and last, but very far from least, invading hosts from the north with hordes of fierce and unkempt followers.

Victorious armies—Greek, Aryan, Arab, Mongol, Mahratta, Sikh—have swept into the fertile plains of Central India from the north or west, attracted by a rumour of wealth and prosperity to be gained by domination over the industrious but unwarlike races which people the heart of India. Exposed periodically to war's alarms, neither inured nor inclined to forcible resistance, the sole resource of the peaceful peasantry was flight. In their case climatic conditions rendered substantial dwelling-houses rank extravagance. A few bamboo poles and a piece or two of matting gave all the shelter necessary. Wardrobes become a superfluity where heat reduces clothing to a minimum. Both of these circumstances proved convenient when attack without or commotion within rendered moonlight flitting at a moment's notice necessary for the bodily health.

So the ryot, or Indian cultivator of the soil, never cared to cumber himself with more household goods than could be borne upon his shoulders, and no more material wealth, beside his cattle, than his waistcloth could conceal—with one exception. Whenever providence blessed the scratching of the soil, he buried a few more coins beneath his humble roof, or hung a few more bangles upon the arms and ankles of his feminine dependants. In modern times, the higher the Indian social scale, the more cumbersome to the wearer do these visible signs of wealth become. It is not uncommon for a dozen heavy silver bracelets to circle each lower limb—some tight to the leg, others wide, and edged with a fringe of little silver balls which make a soft tinkling noise as the wearer walks along. If a lady thus adorned were compelled to journey far, the pilgrimage could not fail to be a painful one. The uncertainty of life, and the unrest caused by successive inroads of fierce, unfriendly strangers, wedded the natives of India to silver, though probably the pleasant contrast of a silvery sheen upon dark limbs had something to do with the choice. When silver had thus acquired a distinct status as a form of permanent wealth, other circumstances conduced to rivet the bond the more firmly upon the Indian people.

Each successive wave of invaders set up a dynasty, whose first act was to claim a tribute—in gold from the rich, and in silver from the poor.

Taught by stern necessity, the Oriental has acquired a weird power of transmitting news unknown to Western lands. Call it telepathy or what you will, a message can be borne upon the breeze and whispered over plain, river, and hilltop without any apparent human agency. In such a way, the dire news of the Indian Mutiny swept the country from end to end within a few momentous hours.

Whenever an attacking horde pierced the frontier, an indefinite tremor instantaneously quivered in the air from village to village and from hill to hill, and in a moment, almost simultaneously and in silence, the long-suffering peasant packed his few belongings in his waist-cloth, and with his pots and pans on the shoulder and his spouse adorned with bangles, stole to a place of safety at a distance. The jewellery, thus capable of being carried upon his wife and girls, became easily converted into cash whenever the crops failed, or sickness brought sorrow to his home circle.

When more settled conditions were established, the ryot had become so accustomed to the use of silver as a savings bank, that a substantial importation of silver became of vital necessity to the wellbeing of the community, and the amount has continually increased until the average import for industrial purposes alone has been from 40 to 50 million ounces per annum—and Government purchases for coinage in years of prosperity has been almost as large. In 1912 the import for this purpose was 47, and, in 1913, 32 million ounces.

These totals seem stupendous, especially when we remember that the world's annual output has only recently exceeded 200 million ounces, but the immensity of the population is the factor that counts. The last census gave the total as 316 millions—a seething mass of humanity; impossible for the mind to grasp! A mere quarter of an ounce of silver per head, say sevenpence in value, amounts to 79 million ounces, or at 26d. per standard ounce, roughly £9,250,000.

If the monsoon—that arbiter of life and death to the Indian peasant—prove favourable, the country teems with the vigour of life. In other words, the marriage and birth returns record with remarkable fidelity the condition of agricultural industry—the mainstay of seven-eighths of the population.

Before the closing of the Indian Mints to the free coinage of silver, silver and silver rupees as treasure were synonymous. That is to say, if a man wanted cash, he took his family jewellery to the bankers, who sent their collective purchases into the Mint, and were entitled to receive from that institution rupees at a fixed rate in exchange, one tola, or three-eighths of an ounce troy, of the quality of 916·6, being the equivalent of a rupee. The above considerations supply the reasons why silver jewellery has been used with such extraordinary freedom to adorn the person and ornament the home of the natives of India.

The cessation of free coinage divorced the value of a rupee from the price of silver, and harnessed it to the all-conquering chariot of gold, and the Raj decreed fifteen rupees to be the fixed equivalent of a sovereign. But custom dies hard—especially customs and habits practised for many centuries by a people whose ideas move slowly. Up to the present day there is little diminution in the quantity of presents fashioned in silver which change hands at marriage festivals or other occasions of rejoicing.

Fortunately for the poorer people of India, the fixing of the gold value of the rupee by the Government, at the time that the Mint was closed, has proved to be of immense benefit to that country. It has encouraged the introduction and retention of foreign capital, and has rendered the markets of the external world more accessible to India, and *vice versa*. Such great prosperity has ensued that the peasant has never suffered to any really appreciative extent from the depreciation in the value of his silver jewellery as compared with that of the rupee.

The fact that silver jewellery is not so good a hedge

ELEPHANTS ADORNED WITH SILVER BOSSES & CHAINS. (*p.* 226.)

against famine as coin, has dawned gradually upon the slow consciousness of the villagers, and the great coinage of rupees in recent years is the outcome of this fact. Hoarding, made hitherto in jewellery or ingots, is now done largely in rupees by preference, or, in the case of richer folk, in sovereigns, more than 300,000,000 of which have been imported into India during the last eighty years. By far the greater proportion was imported during the decade previous to the Great War.

Enough has now been written to show how deeply silver has entered into the life of the Indian people. Under the present Imperial régime the necessity for easily portable wealth has greatly decreased, and silver is used for many purposes besides that of jewellery. The amount worked up into personal ornaments is enormous. It is reported that a woman sometimes wears at one time jewels of silver weighing about 300 tolas, or 112½ ounces troy. Wealthy people are accustomed on festive occasions to adorn their equipages, horses, elephants, camels, and even bullocks, with festoons of silver jewellery. In the home, those who can afford the expense partake of their meals from silver plates or bowls, and it is no uncommon thing to see people drink water from silver mugs. Abundance of toys are fashioned in silver, and fancy coins are made for the purposes of being strung into necklaces. Images of gods and goddesses are sometimes fashioned of silver; that of Situla is always so. The temples themselves are enriched with it. Silver domes glitter in the brilliant sunshine, and massive doors are impressive with embossed plates of silver, as well as the walls and pillars within. Silver is even used for internal consumption, for it is prescribed on occasion as a strengthening tonic. Sweetmeats, Pan Soopari, are generally covered with very thin silver paper which is eaten with the delicacy.

The wonderful sculptures from the Buddist Tope at Amaravati, exhibited on the walls of the grand staircase of the British Museum, show a royal male personage or deity, accompanied by female figures, who wear many bangles round their arms and ankles, and thus give

evidence of the great antiquity of such personal ornaments. In Central India flexible necklets and armlets are worn, fashioned with movable scales.

The art of enamelling has been carried to a high degree of excellence—indeed it has been described by Sir George Birdwood as the master craft of India. Ornament of this description frequently is imposed upon articles such as buckles, bracelets, studs, boxes, and bowls. Sometimes the design is struck from a die, and small rims of silver are left, between which the enamel is inset. At other times silver wire is inlaid, so as to divide the schemes of colour, and the effect is not unlike that of cloisonné ware. Lucknow is well known for its enamel. The pattern is etched on silver, and is so minute as to appear at a distance like the corrosion of verdigris.

In Portabgath in Rajputana a peculiar work is applied to ornaments formed of glass—green or red in colour. A frame of silver wire is made to fit exactly over the glass, upon which tinfoil, inserted behind the glass to impart brilliancy, is embedded by fusion. In this way belts, brooches, plates, and other articles are embellished.

The silver-plate of India possessed until recently four or five well-marked types of ornament, which enabled the connoisseur to identify the place of origin; but within the last few years the silversmiths of India and of Burma have adopted a variety of styles which are confined to distinct localities.

Bangalore in Madras produces silver-plate called 'Sivami,' so called because it is encrusted with mythological figures and canopies. This type of art lends itself to objects of a considerable size, such as bowls, flower-vases, fruit-stands, etc. In Trichinopoly, filigree jewellery is manufactured on a large scale. Travancore artisans form flat articles like trays and picture-frames from the silver coins of that state. Bombay is noted for two distinct types of ornament, called the Poona and the Kach. The former is a very deep pattern in repoussé, the subjects being rendered in half relief, and usually oxidised. The latter, supposed to be of Dutch origin,

is a graceful pattern—with no beginning or ending—composed of flowers and branches upon a frosted background. Baroda is renowned for furniture covered with silver, by the simple process of hammering thin metal sheets upon richly carved wood.

The most important manufacture of silver in the Punjab is to be found in Kashmir. Until quite a few years ago the State had practically only three or four styles of design for silver work, namely, the shawl, perhaps the most beautiful and distinctive of all Indian designs—now alas! beginning to be considered too expensive to be undertaken—the arabesque, the rosette, and the modern chunar or plane-tree patterns.

Benares, Alwar, and Gwalior affect silver gilt designs; whilst Jhansi is numbered amongst other localities which produce filigree work.

Burma manufactures silver-plate extensively in the form of bowls, jars, plates, etc. Rangoon work is usually frosted with parts touched up with a burnisher, but that of Moulmein is polished throughout. In both places the designs are in repoussé and consist of human forms and hunting scenes. The chief silver industry in Burma is the manufacture of the well-known bowls beaten up from discs of silver, larger and very much thicker than a rupee hammered out until the thickness is about $\frac{1}{8}$ of an inch; the bowl is then filled with lac, repousséed and richly chased. The effect is very pleasing.

The elegant art of damascening had a great vogue in ancient times, but the craft became doomed when individual importance in warfare ceased to exist. In the days of armour and hand-to-hand fighting, the noble and rich vied with each other in the beauty of their appointments. Armour and arms alike were incrusted, and damascened with the precious metals. The museums and the treasuries of Indian princes contain many superb specimens of such work. The art used to be applied to swords, daggers, shields, matchlocks, as well as to pieces of armour worn upon the person.

Although India proper produces practically no silver, the outlying territory of Burma has yielded silver for

very many centuries, and promises under modern control to figure most importantly in the future. The mines are situated at Bawdwin in the northern Shan States of Burma, some 500 miles from Rangoon. They were worked by Chinese from Yunnan until about eighty years ago, and traces of Chinese activity are apparent everywhere, notably the galleries driven into the hillside, and the enormous heaps of zinc-lead slag, thrown away after the silver and a portion of the lead had been smelted out.

Certain remarks by Marco Polo (1275 A.D.), the great traveller, possibly refer to these Burmese mines. One of the Chinese emperors presented a large bell to his subjects working in this locality. At the present time Chinese are employed at the mines, travelling to and fro thousands of miles. As their earnings have hitherto been in rupees, they have hitherto lost on the exchange value of their coin in China. The Company have considered the desirability of paying them a proportion of their earnings in pure silver, so as to avoid such loss. It is anticipated that the production of these mines will reach about 3,000,000 ounces per annum.

A TIYAN GIRL. (*p.* 231.)

CHAPTER XXII

THE MARKETS OF INDIA

Chokseys, shroffs, etc.—Their wealth—Up-country dealers—Crumbs for all—Bulls, bears, and police—The Bombay Silver Merchants' Association—Native States—Import duty—Tempting counter for speculators—Silver feminine—A silver corner—Why dangerous—Swadeshi movement—Indian Specie Bank—Chunilal Saraya—Squeezes for delivery—Doomed to failure—£6,000,000 worth—Indian Government enters arena—Banks' doors closed—Syndicate saves situation—Premchund Roychand and cotton.

THE relation of the Indian people to silver is so important, and enters so closely into their national life, that bullion dealers and jewellers figure in the census returns very prominently indeed.

The principal silver markets are situated in the great cities of Bombay and Calcutta. That in Bombay is composed of bullion dealers, styled chokseys, shroffs, speculators, and brokers. The chokseys are about twenty-five in number, and form the real basis of the market. The major portion of the silver introduced into India is imported by them, and they are in close touch with the London silver brokers, from whom they receive information as to market prospects, the accuracy of which enables them to direct their operations which radiate throughout the peninsula.

As a general rule, the silver is financed by the great Anglo-Eastern banks, who pay for the silver before shipment from London against the deposit of the bills of lading, insurance policies, and invoices. A rate of exchange price is arranged previously in Bombay between each bank and the importing choksey, so that the fixed equivalent in rupees is paid to the bank on arrival, and the silver then becomes the property of the importer.

Chokseys sell their silver in the bazaar at their shops either in whole or cut bars. Their individual wealth is estimated at from Rs. 50,000 to Rs. 10,000,000 and varies from settlement to settlement, owing to the highly speculative manner in which they conduct their business. Shroffs are Indian bankers who form the link between chokseys and up-country dealers. Their profit is derived from a commission upon the business which they transact. They buy silver from chokseys, and despatch it by rail up country to their clients. They are also prepared to deal on behalf of country clients in silver for delivery at future dates, and thus, having intimate acquaintance with the ins and the outs of the market, are able to turn over their capital very profitably by lending upon silver with little risk to themselves.

Some shroffs are very wealthy, and their fortunes are estimated at a crore of rupees, or £666,000. Around these central constellations revolve lesser planets, the local speculators, and, in a wider orbit still, the customers who dwell up country. Operations undertaken by these gentlemen often far exceed their financial stability, and many an enterprising speculator has soared like a rocket, and come down like a stick. The speculative centre seems to lie in Calcutta.

Further, there are about three hundred brokers, mostly Marwaris, with limited means, who hover round the chokseys, shroffs, and speculators, eager to pick up a few crumbs from the feast, which, when the market is active and fluctuating, are quite plentiful enough for all. The spectacle in such times is very animated: a large crowd of shouting bulls, bears, and brokers gathers around the shops of the chokseys, closing and opening transactions in hundreds of bars for the different settlements. Scenes of excitement are not uncommon when police intervention is necessitated by obstruction of the public traffic.

In order to avoid disputes the chokseys, shroffs, and dealers have combined to form an association called 'The Bombay Silver Merchants' Association,' which has framed rules for the conduct of silver business in the

market, and has the power to enforce its decision, owing to its representative character.

The full moon day is the option day, and the settlement day falls five days later. Silver of the fineness $\frac{996}{1000}$ or better is good delivery at the settlement. Contracts are made in bars cum duty at so many rupees per fine tola—the quality of $\frac{998}{1000}$ is conventionally considered as fine—and if the bars prove to be either side of 2800 tolas in weight, the difference is adjusted at the rate ruling at twelve noon on the day of settlement. China banks enter also into the market, as operators for forward delivery.

The composition of the Calcutta market is pretty much the same as that in Bombay; but at the time of writing no formal association of dealers has been created. The Calcutta settlement is fixed three days after that in Bombay so as to leave time for silver, which has changed hands at the Bombay settlement, to reach Calcutta in time for the settlement in that city. The volume of business, and the up-country demand are both smaller than those in Bombay.

As a general rule, silver for the imperial coinage is purchased in London, but the requirements of the native states are met in the Indian markets, and reach a considerable total.

The import duty upon silver was raised from 5 per cent. to 4 annas per ounce in the budget for 1910-11, with the proviso that seven-eighths could be returned upon re-export, provided original invoices were furnished. The reader will have now concluded that silver is an important article of commerce as a consequence of the enormous industrial demand, and that it is a tempting counter for speculators in India, with chances of great prizes for the fortunate.

The price, however, has an awkward knack of moving in unexpected directions, and the most expert dealer in this metal finds frequently that the wisest plan is to act quite contrary to his most careful and well-founded deductions. Can it be that silver—the beloved of womankind—circled for centuries around the arms,

necks, and nether limbs of myriads of India's dusky daughters, has drawn from that tender association the waywardness described so aptly by the poet?

> 'Oh woman, in our hours of ease,
> Uncertain, coy and hard to please.'

During recent times the world has become familiar with rings and corners in wheat, oil, meat, etc. Such commodities being in daily request are more or less vital to the wellbeing of the community, and, as a consequence, lend themselves only too readily to the manipulation of speculators. Overmuch optimism, or some unexpected factor, such as a phenomenal harvest, has often falsified the hopes and calculations of the most astute of men. Base metals also have not escaped the grasp of speculators. The enormous French dealings in copper, which culminated in a disastrous débâcle in 1889, spreading ruin far and wide, even to the suspension of banks, are still a bitter memory to many.

It has been reserved, however, for quite recent times to witness an attempt to corner one of the precious metals. Three factors have hitherto acted as a deterrent—namely, the great value of these metals, the heavy annual output, and, lastly, the large amount of each metal in existence, not only held privately in the form of coin and articles of luxury or ornament, but what is far more important, as reserves of money in the vaults of governments and banks.

In the year 1910 a huge speculative movement was originated in Bombay in order to forestall a probable demand for Indian coinage, and in that and successive years enormous stocks of silver were accumulated in that city as well as in London.

The annual output of silver then averaged about 220,000,000 ounces, roughly £24,000,000. The absorption of the large portion required for coinage is always intermittent, being dependent upon the individual necessities of the several governments.

In these circumstances the brain that could conceive a plan for cornering silver needed to be daring and

A NAIR YOUNG LADY.

(*p.* 234.)

reckless to an extreme degree, for the opposing forces were not the public alone, to whom silver is an article of luxury and not of necessity, but governments, whose use of silver forms but an adjunct—in many cases certainly a most important adjunct—to their currency systems.

In the last few years preceding 1910 a powerful movement, described in the vernacular as 'swadéshi,' had been initiated by the native-born inhabitants of India, with a view to conserve within their own hands the management of affairs in India, both governmental and industrial. The movement comprised the formation of banks, whose officers and capital were to be native. One of the most ambitious of these concerns was the Indian Specie Bank, the capital of which was subscribed with enthusiasm, and whose directors included maharajahs and other prominent native personages. Under these favourable auspices the bank found no difficulty in obtaining an important share of native business, and enjoyed the advantage of a substantial amount of deposited funds.

The management devolved into the hands of Mr. Chunilal Saraya, whose experience and abilities appear to have compelled the bank in the long run to entrust him with unchecked control over the operations and funds of that institution. This gentleman set himself to dominate the silver market in Bombay. Flattered by success and imbued with the idea, so fascinating to the Indian mind, of Napoleonic ventures in finance, he conceived the idea of cornering the world's supplies of silver.

Once embarked upon the enterprise, the speculators sought to compensate themselves by various ingenious methods, for the loss of interest incurred by carrying so huge a stock of silver. On two occasions severe squeezes for delivery in London were engineered by securing control over the spot supplies. That is to say, by purchasing silver, paying for it with borrowed money, and selling it for future delivery.

On the first occasion the tension was maintained for exactly a month, from 2nd July to 2nd August 1910, and a premium as high as $\frac{7}{8}$d. or $3\frac{1}{2}$ per cent. was paid for delivery of silver within a week, as compared with that

for delivery in two months' time. On the second occasion, the pressure lasted from 7th November to 20th December, but it was not of so acute a character as on the former occasion. The highest premium during the latter period for cash delivery was only ¾d. or nearly 3 per cent.

Similar methods were adopted several times in the Bombay market also, but, as a whole, although substantial profits sometimes resulted from these corners of delivery, the expense of carrying silver upon so large a scale for lengthened periods more than set off these gains.

Mr. Chunilal Saraya was doomed to failure for several reasons. He miscalculated the date when the Government of India would enter into the market. He overlooked the fact that the production of silver is not only large but also automatic, for it goes on whether wanted or not, being mostly derived as a by-product in the mining of other metals, and failed to take into account that the finance would become increasingly difficult to arrange as well as costly.

In the course of three or more years he found that he had to be constantly in the market as a buyer, in order to keep up the value of his stock, and thus to be ever adding to his commitments. It is probable that at one time he must have been responsible for £6,000,000 of silver, either in the form of actual silver or upon contracts for forward delivery. The accumulation of this vast quantity involved enormous expense in the form of interest, and the cost of prolonging contracts for delivery, and also necessitated the provision of margin.

The only hope of retrieving the situation lay in the prospect of purchases by the Indian Government. These long-expected purchases were made at length, and the Indian Specie Bank succeeded in selling £3,000,000 to the Government in 1913, before its requirements were satisfied.

On the 1st December the Indian Specie Bank came to the end of its resources, and closed its doors with £3,000,000 of silver still on its books. At this point a syndicate was formed to take over this unrealised stock. Important interests in China were at stake, as many

innocent parties would have suffered severely, if so large an amount of silver had had to be thrown upon the market.

Great relief was experienced when a syndicate, of which the Hong-Kong and Shanghai Banking Corporation and the Chartered Bank of India, Australia, and China formed part, dealt with the unique situation. The price of silver was $26\frac{11}{16}$d. on the day that the Syndicate was formed. It was $26\frac{15}{16}$d. when the last ounce of its silver was disposed of.

It was a most remarkable achievement, one which amply justified the momentous task undertaken—that £3,000,000 of silver—about one-eighth of the world's annual supplies—should have been realised with so little disturbance in four months, with actually a rise of $\frac{1}{4}$d. in the price. Without any doubt, the forcible sale of so large a quantity would have absolutely demoralised the market, caused a fall of some pence in the price, and brought it to a figure lower than any recorded in connection with the metal.

Operations on an abnormal scale seem to possess a remarkable attraction for the Indian native. Some may remember the financial disasters which overtook Bombay in the year 1865, in consequence of the wild finance of Premchund Roychand at the time of the American Civil War, when the price of cotton rose, and put princely fortunes within the reach of Bombay merchants. As a result of manipulation by this financier, speculative enterprises were launched at enormous premiums, so that a Back Bay Company share, with 5000 rupees paid up, changed hands at 50,000 rupees. These excesses were followed by seven years of depression, and yet there are Indians who still revere Premchund Roychand as a master mind of finance! The difficulties which followed the collapse of the Indian Specie Bank were by no means comparable to the disasters of 1865. In the main, the failures, apart from the silver speculation, appear to have been the outcome of optimism, very natural after favourable crops during so many years in succession.

CHAPTER XXIII

THE RUPEE

A standard for one-fifth of the human race—Nearly four hundred years old—Gold not people's currency—Queen Elizabeth jealous of Philip—'John Company'—Australian gold discoveries—Rupee rex until 1893—The British sovereign—Types of rupee—Weight and quality—Radical function of currency—Internal and external relations—A native family budget—Size and poverty of India—Handiness of the rupee—The ryot's hoard—Scantiness of cities—A singing cow—Currency notes—Foreign trade—Bimetallism—London only free gold market—Credit all powerful—A shrinking rupee—Steadiness of exchange desirable—Reserves against currency notes—Gold costly and wasteful—Chinese currency reform—Sea water and gold—Gold output and prices.

No excuse is needed for the devotion of some considerable space in this work to the question of Indian currency. The unit is the silver rupee, and this coin is the standard of value for one-fifth of the human race. No other silver coin holds so wide a sway.

The history of the rupee dates back to the year 1542, when Sher Shah minted a silver coin of that name, weighing 179 grains troy (the present rupee weighs 180 grains troy). The rupee had a predecessor under another name in the tanka of 175 grains troy, which was struck as far back as the thirteenth century.

The multitudes of poor folk in India could not possibly have used with freedom a gold mohur over 30s. in sterling value, especially before the rule of the British Raj had blessed that war-ridden country with the Pax Britannica, had raised the status of the labouring classes by its fostering care, and had assured enjoyment of the fruitful arts of peace.

It is true that, under that old Hindoo system which succumbed to the Mussulman, the unit of currency was gold, and the quantity of native gold coin, in existence

LANDING SILVER AT BOMBAY. (*p. 238*)

for many years after the British régime had been established, seems to indicate that gold had been legal tender. These coins continued to be issued by a number of petty rajahs and rulers of petty states, under the rule of the Mohammedan dynasties.

Both before and after the time of Akbar, Emperor of Delhi, many mohurs bore symbols associated with Delhi, Bhopal, Jeypoor, Jooppore, and Kota. It is very probable that gold occupied the position of what is generally described as a 'money of account.' The actual pieces figured more in the treasure-houses of the great and wealthy than in the hands of the common people.

Colonial coins were struck for use in India during the reign of Queen Elizabeth, in connection with the company formed in 1599 to promote trade in that country. The reason was given that 'her name and effigies might be hereafter respected by the Asiatics, and she be known as great a Prince as the King of Spain.' It is remarkable that, nevertheless, these coins were almost the only ones struck during the reign of Elizabeth which do not bear her effigy. They were intended to compete with the Spanish dollar, at that time largely current throughout the East. The denominations included a crown, half-crown, shilling, and sixpence, all in silver, and were intended to circulate respectively as eight, four, two, and one real pieces. The East India Company acquired the right to coin rupees for India in 1671, and continued to do so from time to time until 1858.

The fear that the remarkable discoveries of gold in Australia would cause great depreciation in the value of gold induced the Government of India to legislate in the year 1835 that no gold coin should be legal tender in any of the territories of the East India Company, and the enactment remained in force until the British sovereign was made legal tender in 1899.

In 1841 the Indian Government issued a proclamation that officials in charge of treasuries were authorised to receive freely gold coins issued from the Government mints subject to regulation as to weight, at rates denoted by the denomination of each piece. This enactment

continued in force until 22nd December 1852, when a notification was issued cancelling a portion of the proclamation, and intimating that 'on and after 1st June 1853, no gold coin will be received on account of payments due, or to be made to the Government in any public treasury within the territory of the East India Company, but that it will be received for coinage.'

From this date onward the currency of India remained entirely upon a silver basis until the year 1893, when the British sovereign was made available for taxes at the rate of fifteen rupees to the sovereign sterling. This was followed by a decree of the Indian Government in 1899 making the sovereign legal tender at this ratio to the rupee. Thus India now enjoys a current gold coin, namely, the sovereign, and the Indian mints have recently been authorised to strike the coin in question.

The mohur in past times coined by the Indian Government was precisely of the same weight and alloy as the rupee, namely, one tola, or 180 grains troy in weight. It contained therefore 165 grains pure gold and 15 alloy.

The word 'rupee,' the unit of value throughout India, is generally considered to be derived from the word 'rupya,' which signified a silver piece. In the early part of the nineteenth century many descriptions of this coin were in existence. A partial enumeration is as follows :

1. The old standard Sicca rupee of 1793-1817, with an oblique milling.
2. The new standard Sicca rupee of 1818-1832, with a straight milling.
3. The new Sicca rupee with a plain edge, no milling, and a dotted rim on the face.
4. The old standard Furruckabad rupee (under Regulation XLV. 1803), with an oblique milling.
5. The Benares type, coined 1806-1819, also an oblique milling.
6. The new standard Furruckabad rupee, coined at the Furruckabad Mint, 1819-1824, and at the Benares Mint, 1819-1830, and at the Saugor Mint, with an upright milling.
7. The Furruckabad rupee, coined at the Calcutta Mint, with a plain edge and plain rim on the face.

The coins struck before 1793 at the old mints of Patna, Moorshedabad, and Dacca, and various rupees anterior to 1806, and the coins of all the native independent states are recognisable by their having no milling. The Company's coin, up the country, is thus generally called 'Kuldar' (milled or made by machinery), in contradistinction to the unmilled or native coins, which are fashioned and stamped with the hammer and anvil.

8. The Madras rupee, with the dotted rim on the face and an indented cord milling. That coined in Calcutta had an upright milled edge.

In the process of time the Indian Government gradually demonetised these various coins, and substituted in May 1835 a Government and Company's rupee of 180 grains in weight.

A further fresh issue was made in 1840, and about four years later in a coin of rather small size.

In 1862 a Government rupee was initiated with auxiliaries in silver and copper, the rupee being of the same weight as that of 1835. In subsequent coinages the same weight and quality have obtained, though the dies have varied. Each rupee consists of 16 annas, composed of 12 pies. 8, 4, 2 and 1 anna pieces are now struck in nickel instead of silver; whilst $\frac{1}{4}$ anna, $\frac{1}{8}$ anna, and $\frac{1}{12}$ anna pieces are composed of bronze.

Prior to the year 1893 the sterling value of the rupee was governed more or less by the intrinsic value of its silver contents. Previous to 1871 fluctuations in the price of that metal were slight, and the rupee was worth, speaking roughly, 2s. 1d.

The evolution of the present Indian currency system is of more than ordinary interest because of the vastness of the problem, and also because it touches again and again those fundamental principles upon which the convenience, termed money, is based. A right understanding of what has taken place with regard to the rupee will clarify many a mind from erroneous ideas with regard to the coins which enter so largely into daily life.

The radical function of currency is to provide a

fixed basis for the barter of goods. If a community were permanently shut in from the outside world by a ring fence, it could fix anything it chose as a basis. Beads, shells, cloth, buttons, etc., have served, and do still serve such a purpose in those parts of the world difficult of access, and there is no reason to suppose that the system works otherwise than satisfactorily to those who care to adopt such a currency. A critical time, however, arrives to such races when they come into contact with nations that possess another standard of value. They find exchange has a tendency to become one-sided, and are compelled ere long to remodel their currency to suit external trade. It is thus possible for a currency to be adapted perfectly to the internal needs of a people, but to be unfitted for the adjustment of trade with strangers.

Let this principle be applied to India. Here is a vast country nearly half the size of Europe, which, a few centuries ago, was almost in a ring fence, so far as the rest of the world was concerned. Compared with the standard of living amongst Western nations, the people are extremely poor.

The narrow margin available for existence is shown by a budget of an agricultural labourer's family (Kori by caste) in North Bihar, as given in the *Economic Journal* of September 1916. The head of the family left home some years ago to seek work in Bengal, and has not been heard of since. There are three sons (aged eighteen, eight, and six years respectively), and a daughter of eleven years. Rámji, the eldest son, is married, and the household accordingly comprises three adults (viz. Rámji, his mother, and his wife) and three children. Rámghulám, though only a child of eight, earns full wages as a field labourer, viz., 2d. a day. People call him puránia, i.e., old for his years. Rámji is a ploughman on the same wages, which are paid sometimes in cash, but generally in kind. Rámji and his brother bring home as their wages 8 lb. of coarse grain (millets, pulses, etc.), of which the family require 7 lb. at the very least for their daily consumption. In cash this represents an annual

income of £6, of which 15s. at the most can be laid aside to meet other expenses. Clothing, for example, costs an average of 2s. per head for the women, and 3s. per head for the males, i.e., 15s. in all. Other necessary expenditure, amounting possibly to 10s., has to be met chiefly by economising in diet by substituting sakarkand (sweet potato), the cheapest of all foodstuffs, during part of the year for grain.

That the family lived absolutely from hand to mouth during the year for which particulars were obtained, is evident from the fact that on two days, when Rámji and his brother were without employment, they had to borrow grain for their daily needs. Again, they had to borrow 8d. for the purchase of fruit, wheat, etc., to enable them to celebrate the chhath (or sun-god) festival.

Their poverty was aggravated this year by the fact that in the half-acre of land which they cultivated they produced only some sakarkand, their crop of maize being ruined by floods.

The family live in a hut containing only two rooms. They possess three cows of the value £4, 10s. in all, and some goats. Their household furniture consists of a brass dish, 1s. 4d.; two brass lota, 1s. 10d. each; miscellaneous kitchen utensils, 1s.; grindstone (flour mill), 2s.; total 8s.

The summary of their expenditure is as follows:

Food.	Clothing.	Other Necessaries.	Other Expenditure.	Total
£ s.	s. d.	s. d.		£ s.
4 15	15 0	10 0	..	6 0

An income of half a sovereign a month upon which to maintain a family, including aged relatives, sounds rather small to English ears. What sort of coin is likely to change hands in the myriad transactions of daily life among 300,000,000 of such comparatively poor people? Those who live, or have lived amongst them, say copper pies, 12 for 1d., and annas, 16 for 1s. 4d. (the present value of a rupee), and that they have no more use for a 15 rupee coin or sovereign for their daily needs, than a

Londoner would have for a £5 note when he has occasion to pay at the bookstall for his daily paper! The Indian demands, as the basis of his internal currency, a coin universally acceptable to his fellows, and of a value commensurate to the size of his daily transactions. No more suitable or handy coin can be found than a silver rupee.

Here it would be well to pursue another line of thought. The Indian native is a born hoarder. Generation after generation of unrest has passed in India. Great empires in succession have risen and fallen, and the coming and going of each ruling power has been bad for the peasant. So, throughout the ages, he sank his little pile in mother earth, to be disinterred in another, and perhaps happier time.

'Will the British Raj last any more than the others? he says. 'It is true we are not ground and taxed to death as in the past; so much the better for our underground reserves.' For this operation nowadays, he prefers to secrete a portion in gold. He can better afford it; it is handier for hoarding, and it is less bulky for carrying.

The cities of India can be numbered almost on the fingers, for three-quarters of the huge population of India are humble tillers of the soil. A few miles outside Calcutta is jungle. With the exception of the Punjab, the richest agricultural district, and the few important cities, combined operations involving large sums of money are few and far between. The masses depend for daily business on the silver rupee and its fractional parts, and are likely to do so for many years to come. The wealth, convenience, and comfort of the masses in any nation ultimately dictate the form of currency most suited to their use, or in the whimsical terms of a Tamil proverb, 'a dancing cow must be milked dancing, and a singing cow must be milked singing,' and it is fair to assume that an ample provision of silver coin is a vital necessity to the people of India.

Currency notes have been provided by Government for the purpose of relieving the public from the incon-

SHROFFING RUPEES. (*p. 244.*)

venience of transporting coin in bulk from place to place, and for other general conveniences. The due encashment of these notes is ensured by reserves of various descriptions. Provided internal trade alone were concerned, it would suffice if a fit proportion of these reserves were held in silver rupees, and the remainder in securities readily convertible into such coins. As a matter of fact, the note reserves are in many ways much stronger than this; the need for such special care is that the note issues form a link between the internal and external trade of the country. The several component parts of these reserves will be considered later on.

The balance of trade against India, except in the case of China, and a few countries of insignificant importance, must be discharged in gold, or upon a gold basis. The balance of trade in favour of India can be remitted in any form which the creditor chooses. No circumstances can deter a creditor nation *in the long run* from importing gold if it so will. It is most important to the merchants of India that the standard of value used as a basis for external trade should show the least possible variation as regards that of other nations with whom they trade, and that it should maintain—as far as human foresight can ensure—a fixed ratio to the currency handled by the great mass of Indian people. The larger the volume of external trade the more essential is this detail, for oscillations in foreign exchange affect the internal prices of a country to a degree proportionate to the extent of its foreign trade, and any one who has a practical knowledge of the subject is aware that oscillations, whichever way they may incline on balance, cannot fail to be expensive to the inhabitants of a country. What was a minor consideration when India's trade was comparatively self-contained, grows increasingly important as the volume of its exports continues to expand year by year.

About fifty years ago the necessity for liquidating the external debt of India upon a gold basis alone was negligible, and it was immaterial, economically considered, whether silver or gold was the currency of India.

At that period the two metals were fixed by a consensus of the Powers at a ratio of about 15 to 1, but the immense increase in the production of both metals during succeeding years made their 'combined' use undesirable as a basis for measuring international wealth. The burden of settling the world-wide relations of trade—that is to say the formation of an international basis for currency—was shifted by one nation after another on to the shoulders of gold alone, whilst, on conditions varying according to the needs of individual nations, the burden of home currency was laid upon silver, with the solitary exception of Great Britain. Divers systems have been adopted by nations for the purpose of maintaining some sort of fixed ratio between coins in the two metals so as to preserve unlimited legal tender, but, in this country, silver coins only remain in use as mere tokens, in consequence of their legal tender being restricted to a maximum of forty shillings.

Gold is stored normally to the extent of one hundred millions sterling or more in the note reserves of France, but, wealthy and powerful financially as that country has been, no holder of notes is entitled legally to obtain gold in exchange therefor from the Bank of France, which reserves the right to pay in silver five-franc pieces. On the other hand, the Bank of England contracts to pay gold to the presenter of its note, which enjoys the privilege of being legal tender in this country.

Without discussing at the moment the reason for Great Britain being an exception to the otherwise universal rule referred to, it is evident that the financial authorities of the great nations of the world are content with the practical fixation of a certain legal ratio between its silver and gold coin. In the case of France, the ratio is 15 to 1; in the case of India, 22 to 1, nearly 50 per cent. more on the side of safety. The ability of any nation to import and retain gold in reserves or circulation rests on whether it be a creditor nation or not. It is an entire fallacy to suppose that the mere provision of a legal standard for gold, or of coinage facilities such as a mint, can create such an ability.

Provided India exports more commodities than she imports, she can always secure gold as a settlement of the balance; on the other hand, if the balance of trade be against her, gold must be found, or the exports of her commodities must be increased, provided that temporary expedients such as a loan be not feasible.

At the time when India was compelled to come into line with the rest of the world, and to cease from the free coinage of silver, the rupee had shrunk from 2s. 1d. to 1s. 1d. Had the free mintage not stopped, the value of the rupee would subsequently have dipped below 10d., rendering the gold debt of India to this country for administration and loans 60 per cent. heavier than it was, and penalising Indian imports to a very serious degree.

Another disability which attached to the free mintage of silver in India was the risk of wide fluctuations in the gold value of that metal, and, as a consequence, sympathetic movements in its foreign exchanges. Whilst the value of silver thus fluctuated and the Indian mints were open to free coinage, merchants and traders, within and without India, found that they possessed no sure basis on which to base their transactions. The most carefully arranged business sometimes became disastrous, owing to oscillations in the gold value of silver impossible to be foreseen.

The influx of capital into India was rendered a wild speculation instead of a sober, reasonable investment, for no one could be sure what would be the gold value, either of future interest, or of the ultimate return of the borrowed capital. This difficulty would not have arisen if it had been possible for gold instead of silver to be the principal circulating medium within the Indian Empire, as it is in that of Great Britain ; this idea, however, has been demonstrated already as too fanciful for actual realisation. The circulation of gold coins from hand to hand is always a costly proceeding owing to wastage and other causes. In India considerations of distance and peculiarities of climatic conditions render the internal use of gold on anything like a general scale quite out of the question.

Attention may be profitably directed to some of the methods employed by other nations to maintain a fixed relation between their silver currency and gold—on the basis of which the balance of trade between all the important countries of the world is settled. China is a notable exception, on account of the size of its population, about one-quarter of the human family. The Government of China has often pledged itself to remove the inconveniences arising from this anomaly at an early date, and in the fullness of time, practically the whole world may be expected to measure its values in terms of gold.

Writers upon monetary matters frequently make use of the term 'sound' in regard to currency systems. In practice it is impossible to apply the term to any currency system in existence at the present time, except in a comparative sense. The phrase 'sound' implies a currency proof against any combination of circumstances, whilst, under the present international systems, were payment in nothing else but gold demanded by individuals, even to quite a restricted degree, the maintenance of the system of international currency on its present lines would be impossible. On the other hand, supposing sea water could be relieved, at small expense, of its gold contents, the result would be seriously disconcerting.

After all, gold is but the handiest makeshift available for a 'sound' basis. An ideal world currency, if it is to be a perfect measure of value, should increase or contract in such a way as to maintain the necessaries of life—food, clothing, and rent with a minimum of fluctuation as to price. Gold falls far short of this, for, not only does its output vary considerably (it has increased 300 per cent. in the last twenty-five years), quite independently of the wealth of the world, but its demand, as a commodity, namely, its absorption for the arts and sciences, is subject to great changes. Indeed, the demand for industrial purposes increases almost coincident with that for coinage, and for the same reason, namely, an increase in the wealth and prosperity of mankind.

PLACING BARS IN GODOWN. (*p. 249.*)

CHAPTER XXIV

THE CURRENCY SYSTEM OF INDIA

Sound currency—London the world's financial centre—Bills on London—Good credit—A barometer—The world's wealth—All flesh is kin—India and the purse of Fortunatus—Its danger—Why—Closing of mint only possible solution—One sovereign and fifteen rupees—The ryot and the monsoon—Succession of good harvests—Gold reserves in London—The gold standard reserve—Annual increase in strength—India Council allotments—Effect of large coinage additions—Peasant savings—Table of coinage.

A 'SOUND' currency is capable of conception, but it is too Utopian for practical consideration, because it is founded on binding international agreements, including the abolition of war, and involves a mutual confidence between each contracting power as to their financial methods and stability.

Laying aside, therefore, the idea of a perfect 'sound' currency, as an impracticable proposition, the world must be content with a system that works with the least possible friction. This is provided by the creation of a financial centre, the most central so far as trade is concerned, as a pivot. London occupies this position, and is the better equipped for the rôle by the fact that it is the capital of the British Empire, whose possessions stretch to the farthest confines of the world, and whose rule, directly or indirectly, affects the welfare of six hundred millions of people. Speaking broadly, the balance of the world's trade is adjusted through London. According to which side of the scale the balance falls, London deals out or takes in gold. So long as a nation remits to this country sufficient in goods or gold, this country is prepared to remit the value of that nation's debt to any other

country, and thus London acts as the world's banking clearing-house.

The power of drawing gold from London, when desired, is the factor which, above all else, provides any country with the means of maintaining foreign exchange favourable to itself. When the trade of a nation is adverse—that is to say, when its imports exceed its exports, it must either deplete its stores of gold or nullify the effect of its adverse trade in some other way. The most economical process by which this can be done is to hold bills on London, or British securities, which, in ordinary circumstances, prove as useful as a gold remittance, owing to the excellent market they possess. This practice is adopted by many Government banks in Europe, as well as by Japan and the United States. Another, but more expensive plan, is to keep cash balances in the Bank of England or other banking institutions in this country. Whilst gold remains a basis for settling international debts, the due relation of the internal currency of any nation to gold can be maintained by ensuring in some such manner that its credit is good in London. It matters little whether its subsidiary coins are minted at 15 per cent., 25 per cent., or even 50 per cent. above their gold value, so long as the balance of its external trade be in its own favour, or that its credit is sufficiently good for the debt to remain in temporary abeyance. It is really impossible to estimate with any degree of accuracy the additional value which has been imparted to money by the coinage of silver and its issue above its intrinsic value. Thus the taxation of the coining countries has been relieved to the extent of the difference between the purchase price of the silver, and its value as minted coin.

The practice of using London as the banking centre of the civilised world has been justified by results. The more it has been utilised, the more have foreign exchanges become under control. It has conduced to the solidarity and comity of nations by rendering London as sensitive as a barometer to the changes of political weather. Without it a large portion of the world's gold

reserves would be shipped from country to country, to commence a fresh journey by the next steamer to another port, and not only would freight and insurance charges thus be frittered away, but a great loss of interest would be incurred, and in the meantime trade might be checked as a consequence of the delay caused by circuitous remittances. By means of the present centralisation, credit can be transferred by cable to far-distant countries with the utmost ease, reducing inconvenience to a minimum. It will be deduced from the foregoing remarks that the easy working of the present system depends on whether the production of gold meets the demand placed upon it, and also on the absence of any movement on a large scale to attract and retain gold to an undue degree.

It is apparent to the careful observer that the pace at which the production of gold increases is not so fast as the rise in value of the world's wealth. India has developed suddenly in recent years an enormous appetite for gold, not for circulation, be it observed, but for the purpose of public and private reserves. These two drains upon the gold output render the currency system of India a matter touching the very pocket of the man in the street, as well as a question which affects the basic foundation upon which the structure of international and national banking has been reared. The day has gone by for any nation on earth to live an isolated life. Never in the history of the world has the truth been made so evident that all flesh is kin, as in these later years. The last line of thought may appear to have travelled somewhat wide of the mark, but the line was necessary in order to pave the way for succeeding pages, which will attempt, avoiding details wherever possible, a lucid description of the currency system evolved in India since the closure of its free mint in 1893, and the particulars that have been enunciated will be found useful in gauging the difficulties with which those responsible for Indian finances have had to grapple.

It will be well to trace the steps by which the system of India attained its present character. When

India possessed a free mint for silver, the position which it enjoyed as a creditor nation gave it power to select whatever medium it chose, in order to adjust the balance in its favour. Whilst other nations discarded silver, the gold value of that metal fell rapidly, but in India, owing to free mintage, three-eighths of an ounce in silver, eleven-twelfths fine, continued to be the fixed internal standard of value to the Indian peasant, for his government mint was prepared to coin that quantity of silver into a rupee. The natural consequence was that India hastened to increase her exports as though she possessed the purse of Fortunatus.

This artificial inflation of currency had two results. The expense of India's administration, which involved yearly remittances to England to the extent of many millions sterling a year, was increased heavily, and trading with the rest of the world was rendered extremely difficult, owing to continual changes in the gold value of silver. The only possible final result of such a state of affairs was that India would become flooded with a currency which other nations would refuse to take back, except on very onerous terms indeed, whenever the settlement of trade balance happened to be in their favour.

Meanwhile, the output of silver continued to increase, and the use of it by other nations for coinage to decrease. The reader must remember that India had to face an annual gold debt to this country of perhaps twenty millions sterling, and to pay interest upon capital borrowed from Europe upon a gold basis, and also to provide for its ultimate return, and that the earning power, to provide the repayment of this interest and debt, was becoming upon a depreciating silver basis. One thing became inevitable—India must close its mints to free silver coinage. This was done in 1893, and the gold value of the rupee speedily rose to 1s. 4d., and has been maintained about that figure until the Great War.

The following is the way in which the fixed gold value of the rupee was brought about. The British sovereign was declared legal tender for government taxes

at the rate of one sovereign to fifteen rupees, so that India could import so long as the trade balance was favourable, circulate, and pay government taxes in sovereigns. The enactment in 1899 of sovereigns as full legal tender made them available as reserve for government currency notes. No difficulty lies in maintaining the value of the British sovereign in India, provided silver rupees are coined in accordance with the demands of internal trade, but to ensure that the silver rupee maintains its value as $\frac{1}{15}$ of a sovereign whenever the balance of trade becomes adverse to India, was the problem which taxed the ingenuity of its financial authorities.

The prosperity of India depends to an enormous degree upon the monsoon or periodic rains. The value of the year's crops, and also, to some extent, of those next year, depends on whether the rainfall is beneficent or not. It may be heavy, yet fall at an undesirable period; it may flood forest and hill, and yet neglect the plains. The monsoon is, to the Indian peasant, the visible manifestation of the Deity. He basks in Its smile, and, alas! starves at Its frown. India has enjoyed a succession of harvests following unusually good monsoons, not only abundant, but commanding good prices for export, and, as a consequence, has required a great expansion of silver currency for the movement of crops, and for the savings of the poorer members of the community.

This means that the Indian Government must purchase silver and mint rupees by the million, for, with such an enormous population, even one-tenth of a rupee a head amounts to 31,000,000 rupees. In 1907 the monsoon proved a lamentable failure. The crops did not suffice for home needs, much less for sale abroad, and the hunger-stricken peasants unearthed their little savings and purchased food at famine prices. In these circumstances, failing the usual exports of commodities, the external indebtedness, which, as has been pointed out, is a yearly charge, had to be met by payment upon a gold basis, for silver rupees are practically not current outside India.

The possibility of such a reversal of the usual conditions had been provided for in the following way. The Indian Government cash balance, and also a large part of the currency reserve, is held in England in gold, or in gold securities, and the India Council, when the emergency arose, offered for tender in India bills and telegraphic transfers on London. The rupees thus obtained represented the transference of government bills and currency reserves from London to India. The same operation rendered the rupees of the distressed Indian peasant available upon a gold basis to meet the burden of external debt, which, owing to the failure of his crops, could not be discharged by the usual sales of produce. In other words, India, in common with other great nations, maintains the ratio between its internal and external currency in the stress of adversity by the conservation of a substantial credit balance on London.

India has advantages in respect of its currency system which no other nation in the world possesses. Its prosperity is linked up with that of this country, and the acts of its legislature are endorsed—one might almost say guaranteed—by the British Government. In December 1915 nearly £16,000,000 sterling in gold or gold securities were held in London, and £10,000,000 worth of sovereigns and securities in India (as a special reserve under the name of gold standard reserve) for the purpose of enforcing a leverage whenever the ratio of the rupee to the sovereign shows the slightest inclination to give way. This reserve increases automatically with the prosperity of India, for, whenever silver is purchased for coinage in response to the demands of Indian internal trade, the profit is placed in this reserve, with the exception of certain limited sums utilised for permanent profit-bearing benefits to India itself.

The effect of coining a large amount of rupees may be made clear by considering what took place in the year 1912, when the Indian Government minted rupees to the equivalent in face value of £10,000,000, in other words 150,000,000 rupees.

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Speaking broadly, the procedure was to transfer £10,000,000 in gold from the Indian currency reserves, to apply £7,060,000 to the purchase of silver sufficient to mint 150,000,000 rupees, and to place the balance of £2,940,000 in the Indian gold standard reserve.

Apart from this special reserve, the Indian currency system has been strengthened immensely during the last few years by huge imports of sovereigns, which circulate or disappear into hoards, and also enter freely into the currency reserves against notes. Should a failure of the monsoon take place, this reserve, and also large amounts from circulation and hoards, would become available to fill the demand for gold remittances abroad. Each year adds strength to the financial standing of the Indian currency system, to the savings of the peasant, and also to irrigation and railway improvements, which, to a remarkable degree, are limiting the area of possible distress, and lessening the severity of famine whenever it may fall upon the land.

A practice of great assistance to the Indian financial authorities for maintaining the foreign exchange of that country upon a steady footing, is the issue of drafts by the India Council upon India each week for part of the debt due annually to the United Kingdom on government account. The amount of rupees offered for tender in London is suited to the demand arising from financing the crops.

Dealing with the Indian currency system from a practical point of view, and taking into account the difficulties arising from climatic conditions, the size of the population, and their poverty compared with a European standard, it cannot but be conceded that its working has proved remarkably satisfactory, that it was well fitted to withstand any reasonable strain—even that of the Great War—and that without doubt it compares very favourably with other systems. No one would deny the existence of faults; these are inevitable, except in the case of a perfect or ' sound ' system, which has yet to be devised.

An official return of rupee coinage is appended.

Calendar years.	Coined in Calcutta.	Coined in Madras.	Coined in Bombay	Total Coined.
	Rs.	Rs.	Rs.	Rs.
William IV., 1835 .	10,90,88,070	11,78,000	5,37,12,502	16,39,78,572
Victoria, 1840, 1st issue . .	17,99,34,670	2,18,98,181	10,98,38,073	31,16,70,924
Victoria, 1840, 2nd issue . .	39,85,53,660	5,50,49,201	31,29,58,076	76,65,60,937
Victoria, 1862 .	26,94,27,222	2,94,81,923	40,80,03,034	70,69,12,179
,, 1874 .	1,50,13,834	..	2,85,08,566	4,35,22,400
,, 1875 .	1,16,31,951	..	1,93,59,597	3,09,91,548
,, 1876 .	1,20,01,264	..	2,89,49,037	4,09,50,301
,, 1877 .	3,92,51,692	..	9,55,54,320	13,48,06,012
,, 1878 .	3,26,57,837	..	6,39,27,196	9,65,85,033
,, 1879 .	1,59,28,325	..	7,27,99,904	8,87,28,229
,, 1880 .	1,83,99,894	..	5,37,85,624	7,21,85,518
,, 1881 .	24,35,719	..	31,61,858	55,97,577
,, 1882 .	1,50,90,289	..	5,63,97,278	7,14,87,567
,, 1883 .	51,23,372	..	1,80,22,789	2,31,46,161
,, 1884 .	1,16,41,757	..	3,68,46,570	4,84,88,327
,, 1885 .	3,41,52,203	..	6,48,78,000	9,90,30,203
,, 1886 .	1,08,78,075	..	4,11,46,457	5,20,24,532
,, 1887 .	4,02,00,148	..	4,84,00,000	8,86,00,148
,, 1888 .	75,68,000	..	6,32,00,000	7,07,68,000
,, 1889 .	93,68,310	..	6,53,00,000	7,46,68,310
,, 1890 .	2,47,41,865	..	9,29,00,000	11,76,41,865
,, 1891 .	1,46,69,903	..	4,95,00,000	6,41,69,903
,, 1892 .	3,24,55,120	..	7,22,00,000	10,46,55,120
,, 1893 .	91,40,310	..	6,95,90,000	7,87,30,310
,, 1897 .	4,70,184	..	10,54,593	15,24,777
,, 1898 .	12,50,976	..	62,68,437	75,19,413
,, 1900 .	5,29,02,591	..	6,52,36,908	11,81,39,499
,, 1901 .	3,37,22,243	..	7,54,13,718	10,91,35,961
,, 1901 coined in 1902 .	3,82,94,644	..	5,48,44,740	9,31,39,384
Edward VII., 1903 coined in 1902 .	25,000	..	..	25,000
Edward VII., 1903	4,93,78,355	..	5,29,69,151	10,23,47,506
,, ,, 1904	5,83,38,617	..	10,19,40,291	16,02,78,908
,, ,, 1905	5,12,57,883	..	7,62,02,223	12,74,60,106
,, ,, 1906	10,47,97,164	..	15,89,53,269	26,37,50,433
,, ,, 1907	8,13,38,000	..	17,09,11,816	25,22,49,816
,, ,, 1908	2,02,17,728	..	1,07,14,770	3,09,32,498
,, ,, 1909	1,27,58,580	..	95,38,746	2,22,97,326
,, ,, 1910	85,00,000	..	91,88,673	1,76,88,673
,, ,, 1910 coined in 1911 .	41,27,013	..	16,96,273	58,23,286
George V., 1911	42,99,924	..	51,43,125	94,43,049
,, ,, 1912	4,51,22,132	..	7,90,67,074	12,41,89,206
,, ,, 1913	7,58,00,163	..	8,74,65,788	16,32,65,951
,, ,, 1914	3,31,00,150	..	1,52,70,000	4,83,70,150
,, ,, 1915	1,11,25,497	..	61,10,087	1,72,35,584
,, ,, 1916	12,01,12,846	..	10,02,07,655	22,03,20,501
,, ,, 1917	12,27,71,075	..	14,97,94,062	27,25,65,137
,, ,, 1918	21,56,49,868	..	22,09,34,647	43,65,84,515
TOTAL .	2,46,73,14,123	10,76,07,305	3,38,83,11,959	5,96,32,33,387

The return represents the total amount of whole rupees, and includes about 76,000,000 coined on behalf of native states.

The metal used for the purpose—about 2,236,000,000 ounces—included old, defaced, and obsolete coins. Were it not so, an average of about 30,000,000 ounces would have been purchased annually. Necessarily this enormous total of nearly six thousand million coins is not now in existence, for a great portion has been used for jewellery in the days of a free mint, recoined, or lost.

Although the actual coinage for 1919 is not yet announced officially, the total is likely to be a record, probably about 44,32,79,700 rupees.

CHAPTER XXV

THE CURRENCY OF CHINA

A vast population—Ancient banking—A simple folk—Copper money introduced during Chow dynasty—Knives and spades—The Golden Age—Coins current minted before Alfred the Great—Silver coins issued in 1183 A.D.—Mongol dynasty and paper money—Marco Polo—Ming dynasty opened foreign trade relations—Silver introduced by Spaniards—Manchus fix relation between copper coin and silver—Fluctuations in gold value of tael—What a tael is—Sycee—Friar Gaspar da Cruz—Sycee by weight—How quality is ascertained—Method of payment—An 'honest dollar.'

CHINA, as a silver absorbing country, is second only to India, and for a similar reason, namely the size of its population. The currency requirements of four hundred millions of people are necessarily enormous. But there are important points of difference between the two countries. China has enjoyed for very many centuries under successive dynasties a civilisation of its own, and the arts and sciences reached a high degree of excellence even in the remote past. Commerce was cultivated actively within the country, but the door was only opened to foreigners in comparatively recent times.

Banking was reduced to a science and bank-notes passed current when the Dark Ages enshrouded Europe like a pall. Mr. H. B. Morse in his book, *The Trade and Administration of the Chinese Empire*, gives a facsimile of a note for 1000 cash, printed upon mulberry bark paper, issued by the first Ming emperor (Hung-tou, 1368-99 A.D.). The existence of an ancient system of banking, and the fact that very populous towns have always formed

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a part of Chinese polity rendered the people of China less dependent upon silver than those of India. The latter country consists of a multitude of villages : the towns are so few that they can almost be counted upon the fingers.

Further, the Chinese peasant has never loaded his womenfolk with silver jewellery like the Indian. China has not suffered so much from irruptions from without, and the disposition of the inhabitants is so peaceable that serious unrest, such a feature of past Indian life, has never really troubled them. In these circumstances easily portable wealth was never in such keen request.

The millions of China lived and died in tranquillity, taking calmly the good or ill that fell to their lot. The government squeezed, its officials squeezed, and if the toiling peasant was squeezed out of existence by a failure of crops, or by an inundation of the Great River, it was all in the day's work. They were content to be treated as children, and desired little more than to live.

The ancient records of China do not throw much light upon the use of silver either for currency or manufacture. The Chinese came into the territory now called China about 2500 B.C., driving the original inhabitants into the mountainous districts and into the island of Hainan, where they still preserve to a large extent their customs and habits. The first settlement of the Chinese was in Shensi, whence they followed the line of least resistance, the valley and the river banks, until they obtained nominal control of the whole country.

The Chow dynasty, dating from 1122 B.C. and lasting until 255 B.C., was remarkable for the introduction of money, all of which was fashioned in copper. Probably weapons and agricultural implements themselves were originally used as currency. Then small metallic imitations of these articles took their place, bearing characters indicative of the nominal value.

They consisted of sword cash and spade cash, and were ultimately shortened and thickened. Then the distinctive sword and spade portion disappeared, and round coins were made, of which the hole in the centre was the only feature left of the handle in the original design.

The approximate dates of the changes in pattern were as follows :

Knife	670-221 B.C.
Spade	600-350 „
Pu. variant of spade	475-221 „
Knife, thick and short	8 A.D.
Spade, thick and short	12 „
Round coins with round holes . . .	660-336 B.C.
Round coins with square holes . . .	221 „

Quantities of the latter, inscribed 'half a tael,' circulated in succeeding centuries, and even now these coins are to be found throughout the whole country.

Commencing with the Golden Age of China—the Tang dynasty 618 A.D.—coins were issued inscribed in square modern character, with the title of the reigning emperor. So large were the quantities that numerous pieces, minted before the time of Alfred of England, are still to be found amongst strings of cash. The same type remained in force throughout the dynasty.

About 1183 A.D. China for the first and only time (until a few years ago) minted silver coins, comprised of 1, 2, 3, 5, and 10 tael pieces. The issue lasted only three years. It is recorded that in 1206 A.D. either silver or silk could be used in payment of the salt tax, but copper appears to have been practically the only metal used as currency by the common people until the entry of Western trade familiarised the Chinese to silver.

The Mongol dynasty, 1260-1368 A.D., celebrated its rule by issues of irredeemable paper money, of which 40,000,000 taels was said to have been put annually into circulation.

Marco Polo wrote some six centuries ago that 'all merchants arriving from India or other countries and bringing with them gold or silver or gems and pearls, are prohibited from selling to any one but the Emperor.' These were appraised and paid for in the paper money of the period, and then 'if any Baron or any one else soever, hath need of gold or silver or gems or pearls in order to make plate or girdles or the like, he goes to the

Mint and buys as much as he lists, paying in this paper money.' A valuable monopoly to the Crown!

The Ming dynasty succeeded and lasted from 1368-1644 A.D. This period is noted for the beauty of its porcelain, and so much was it appreciated by foreigners—who entered for the first time into trade relations with the Chinese empire in 1516 A.D.—that the finest Ming porcelain is now to be found outside the country of origin. Before the century was completed, silver began to pour into the country, chiefly through the hands of Spanish traders.

The Manchu dynasty followed in the year 1644 A.D., and remained in power until the Revolution in 1912 A.D. The inscription upon the copper pieces of the first Manchu emperor stated definitely, what nominally may have been the case since the Tang dynasty in the seventh century A.D., that 1000 of these coins, which each weighed $\frac{1}{10}$ of a tael, were equivalent to 1 tael of silver.

A strong light is thrown upon the difficult exchange relations between China and foreigners by the following table showing the varying sterling value of a tael of silver:

In 1864	. . . .	80	pence	English currency.
,, 1874	. . . .	76	,,	,, ,,
,, 1884	. . . .	67	,,	,, ,,
,, 1894	. . . .	38	,,	,, ,,
,, 1904	. . . .	34	,,	,, ,,
,, 1914	. . . .	32	,,	,, ,,
,, 1916	. . . .	38	,,	,, ,,
,, 1920	. . . .	102	,,	,, ,,

These variations were owing to the changing value of silver, as expressed in gold.

The real basis of Chinese currency has always been copper 'cash,' a word which has travelled round the world, and given its name to ready money. These coins consisted of 60 per cent. of copper and 40 per cent. of spelter, and represented originally, as stated above, one thousandth part of a tael of silver. The relative value of copper and silver has since changed, and as many as 1600 cash have had to change hands for one tael. The tael is not a coin but a weight, slightly differing in various

localities, and may be described as a money of account. In like fashion a guinea is sometimes used as the amount of a donation, although there does not exist a current coin of that value. The three best known taels are the Haikwan, the Kuping, and the Shanghai.

The Haikwan tael is obligatory for customs duties, and consists of 583·3 grains of silver 1000 parts fine. The Kuping tael is used for the payment of all other duties, and may be described as bank money. The normal standard is only 573·9 grains of silver 1000 parts fine for paying, but 575·4 grains for receiving. The Shanghai tael is used as the basis of the trade of Northern China and that of the Yangtze basin. This money consists of 545·25 grains of silver 980 parts fine, but by convention 98 taels thus calculated liquidate a liability of 100 taels. The varying relation of cash to the tael has already been noted, and also the varying relation of some of the taels to each other. There is yet another set of complications that call for remark.

Payment for large amounts is made in ingots, called sycee—a Chinese word signifying 'fine.' These lumps of metal are styled shoes, from their similarity in shape to the foot-coverings of Chinese women. The weight ranges from a few ounces to fifty-six. In making payments the ingots are weighed, in accord with the universal practice of ancient times, and accounted for by weight.

In the amusing old book entitled *Purchas His Pilgrims*, the following description of the weighing of silver as money is given in the words of Friar Gaspár da Cruz, who visited China as early as the sixteenth century A.D.

'Some China Merchants did affirme that Cantan did yeeld every yeere to the King three thousand Picos of Silver, any every three Picos make one Baar, every Baar hath foure Kintals, every Kintall hath foure Arrobas: so that one Baar is sixteene Quarters, and three thousand Picos, making one thousand Baars, by consequence, one thousand Baars make sixteene thousand Quarters (400,000 lbs. weight); and wee speake of weight, for in China is no money of Gold or Silver, but onely of Brasse, the Gold and Silver goeth by weight. But these as they

WEIGHING SYCEE.

(*p. 262.*)

are popular people, though occupied in the trafficke of the Countrie, it seemes they know not well the trueth of this, and that the summe is greater which is collected of the rents Royall, for the Countrie is very great, and the merchandise many and very substantiall. I was informed by meanes of the Rulers, which is more certaine information, because the rents doe passe thorow their hands, that the rent of the Salt in Cantan did yeeld alone to the King 300. Picos of Silver, which doe make 100. Baars, which are 400. Kintals, that are 1600. quarters of Silver (40,000 lbs. weight).

'Every one hath a paire of scales and weights in his house, which all are exceedingly perfect. The weights that they commonly have, are from ten crownes to one, and from ten Tangas to one, one Tanga is nine pence. By the name of their Countrie, the lesser great weight is of one Tael, one Tael is sixe Mazes, one Maez is the same that a Tanga : of the small weights, the smallest is one Conderin, ten Conderins make one Tanga, or one Maez : one Conderin hath ten Caxos; and because the common that goeth in stead of money is Silver by weight, every one hath weights of his owne, as abovesaid : for one laboureth by all the meanes hee can to deceive the other, none doe trust the scales and weights of the other, and every one that goeth to buy in the Market, carrieth a weight and balance, and broken Silver, and the balance is a litte beame of Ivorie with a weight hanging at the one end with a string, and on the other end a little scale, and the string of the weight runneth along by the beames, which hath his markes from one Conderin to ten, or of one Maez unto ten. These scales serve for to buy by retale, for to buy by grosse they have perfect scales very curious and fine, with very perfect weights. They carrie the Silver commonly full of mixture, and because they encrease it with the mixture, from hence it commeth that he which will make good markets in the Countrie of China, and that it may be cheape, carrieth Silver rather than goods, for by the encrease which the Chinas make of the Silver with the mixture, they give the merchandise good and cheape for the Silver.'

In Shanghai silver currency consists of sycee and dollars, but business transactions between banks, etc., are, as a general rule, computed in the latter. Sycee is made from bars of silver, imported by the foreign banks generally from the London silver market, and purchased for the purpose by local Chinese melting-shops. The silver bars are taken as about 998 fine, and are melted and moulded into 'shoes' weighing roughly about 50 Shanghai taels, each tael weighing 565·7 grains.

At the time of melting, sufficient copper alloy is added to reduce the fineness to about 985 parts in the thousand. The determination of the actual worth of a shoe is a matter of some difficulty. This is performed creditably by the Kungkoo, who is entrusted to estimate the purity by 'touch,' and who, after weighing the shoe, inscribes upon it the exact quality of the metal. The Kungkoo's charge for assaying is quite trifling, but 2 per cent. is added to the weight of the shoe from old custom, and this is the reason why 98 Shanghai taels weight of silver circulate as 100 monetary taels.

For example, supposing a shoe is found to weigh 50 taels, and its premium is fixed by the Kungkoo at 52 cents (formerly called by Europeans mace and candareens), the total of 50·52 is divided by 98, and the product of 51·55 taels represent the monetary value of that particular shoe for local circulation. The shoes are packed in wooden boxes of a standard size, each box containing, when full, from 58 to 62 shoes. This irregularity in number is caused by the differing weight and consequent diverse size of the respective shoes.

At the close of business the cash balances between banks are settled by a payment of sycee, which is placed in locked boxes and transported through the Shanghai Settlement. These boxes are carried by two coolies, swung on a rope dependent from a bamboo, or several boxes are placed upon one of the primitive Chinese hand-barrows, which form one of the peculiar sights of Shanghai. Sometimes the transport of silver from bank to bank after the close of a busy day continues throughout the night and well into the following morning, while even

in the ordinary way this cumbersome and antiquated method of settling differences rarely finishes before 7 or 8 P.M.

The silver currency of China handled by the masses consists of dollars, not of one sort but of many, and all bear a varying relation to each other. The system of squeeze prevalent in China has hitherto prevented its people from possessing an honest dollar. In recent years silver coins have been minted by provincial authorities, but either or both the fineness and the weight have often been manipulated, so as to secure a profit for the officials concerned. The result has been that the people of China have preferred the more reliable coins issued by the great silver-producing states, and have only accepted local coins at their intrinsic value, that is to say, calculated by weight and actual, not nominal, quality.

CHAPTER XXVI

SILVER COINS IN CHINA

Currency complications—Not a uniform country—Yuan Shi Kai—Reform on Indian lines—China merchants forced into speculation—Manchester goods—Chinese talent—Chinese indemnity payments—Varieties of dollars—Spanish or pillar dollar—Its recall—Mexican dollar—Trade dollar failures—British dollar—Minted at Bombay—Current in Straits and Labuan—Amount coined—Chopping dollars—Hindrance to mining.

ENOUGH has been written in the preceding chapter to indicate the bewildering complications of Chinese currency, the heavy burden which it must impose upon the common people, and the need for local exchange bankers qualified by expert training to disentangle the hapless customer or merchant from its meshes. Add the intricacies of subsidiary silver coins and the involutions of paper money, together with the anxiety of the native bankers to make a good living, and the situation would be comic, were it not for the unnecessary suffering imposed upon the poorer portions of the community.

Commissions have been appointed, and attempts have been made to bring order out of chaos, but the very necessity of creating uniformity implied a new coin and merely introduced fresh complications. Three obstacles have stood firmly in the way hitherto—the private interests of the banking class, the squeeze of the official class, and the weak control of the central government.

The power of ancient prejudice is giving way now that China is practically open to Western commerce, and the barriers that stand in the way of currency reform eventually must be broken down. In the fullness of time there is no doubt that these 400,000,000 people will be extricated from their monetary bondage.

The great country called China is not one nation so much as an assemblage of nations, many of which possess conflicting interests. Frequently a viceroy of a province has obtained so firm a seat that he has been in a position

PACKING SYCEE. (*p. 266.*)

to defy the government at Pekin. Even the great Dowager-Empress herself sometimes failed to enforce her authority, and had to use secret weapons to obtain the happy dispatch of her nominal servant.

The stability of the government and its power to enforce decrees are the chief factors which will decide the success of the measures adopted. The ex-president of the republic and late emperor, Yuan Shi Kai, was a man of enlightened ideas, but was obliged to move slowly, lest he should arouse reactionary tendencies.

When the desired moment arrives, Chinese currency reform cannot be confined to the unification of the silver coinage alone. Practically all other countries have brought their currency system into a fixed relation with gold. In other words, the standard upon which the system is based is gold, not silver, and China will have to follow suit.

The Straits Settlements dollar and also the West African shilling are the units used respectively by the people of these countries, but these coins actually represent a value proportionate to a sovereign, and are so maintained by a process similar to that applied to the rupee, explained in Chapter XXIV. Profiting by the experience gained by the British Government in the case of these three currencies, China will probably adopt a somewhat similar system adapted to meet the special circumstances of her case. When the change does take place, it is not likely to reduce the amount of silver required by China for currency purposes. No diminution became apparent in India after her mint had been closed to free coinage, and in many respects the position of China is akin.

Stability in exchange with gold standard countries is more than likely to have a similar effect upon the trade of China to that which it had in the case of India, which, as a consequence, has enjoyed an enormous increase of prosperity, owing to the inflow of foreign enterprise and capital. Just as happened in India, the standard of living will rise, internal commerce will be stimulated, and more money, silver money, will be needed for circulation. At

the present time merchants who trade between China and foreign countries—and the great Eastern banks which finance them—are hampered greatly by the fluctuations of silver.

In the present state of the currency, the most conservative and cautious trader in China, be he importer or exporter, is forced to become a speculator, for his calculations for ascertaining a profit depend upon the favourable outcome of one most uncertain factor; namely, will the price of silver—or exchange, which, as has been stated, depends to a large extent on silver—be lower or higher when his goods are imported or exported, as the case may be?

Thus it is no uncommon occurrence for anyone connected with the silver market to be waylaid, and listened to with bated breath by a trader with the Far East, as he seeks to gain some useful knowledge of the silver market, its present and future prospects, in order that he may be guided aright in estimating the outcome of his operations connected with Manchester goods. If, however, he decides on avoiding the risk of exchange speculation, and by so doing to sacrifice part of his prospective profit, he approaches an Eastern bank to know what rate of exchange he can secure, and is given a quotation, allowing a margin to the bank to cover risk of fluctuations. If the merchant accepts, the larger proportion of the bank's speculation is covered by purchases from Chinese brokers, who make a speciality of speculating upon the future of exchange. The relation which the Manchester goods merchant possesses with silver does not by any means exhaust the difficulties attaching to movements of silver prices. There are the native Chinese to consider.

Here you have to deal with the shrewdest and most long-headed of men. No novices in business these, but furnished with generations of ancestral ability for pitting their wits against each other, and for trying to better those of the foreigners. Gamblers born, they introduce into business operations the same zest for chance as they exhibit in playing fan-tan in their hours of

relaxation; not daunted by figures and as ready to deal in £100,000 as in £1000—nay, more so. Consider, then, the import and export merchant at the mercy of these shrewd gamblers, and the silver market a mere counter —now the playground of huge Indian speculative groups, now the pit from which the Indian Government extracts in a few months £7,060,000 of silver, more than one quarter of the world's supply—yet even then the tale of complications is by no means complete.

There are the periodic payments for the Chinese indemnity, and the remitting homeward of interest on Chinese loans. The debt, being payable in gold by the Chinese Government, necessitates the fixing of the exchange at the appointed period, even though the Chinese Government is deferring payment, and the fixture of that exchange must be made so as not to be to the disadvantage of the creditor.

Before passing from this subject, a few details may well be inserted dealing with the foreign coins introduced into China, and there circulated.

The most important varieties of dollar current are the following :

Carolus or Spanish dollar.

Mexican dollar, with the rope edge.

Mexican dollar, with the milled edge.

British dollar, coined at the Bombay Mint.

New Chinese republic dollar, with bust of Yuan Shi Kai.

The Spanish dollar was coined in vast quantities under the auspices of Spain. These dollars were styled 'Pillar' dollars after the Pillars of Hercules—the two rocky promontories standing like huge sentinels either side of the Straits of Gibraltar—which adorn the reverse. The obverse bore the head of Charles IV., 1788-1808 A.D., and for that reason they were also often described as Carolus dollars. Certain dollars have the motto 'plus ultra' round about the Pillars, a reminder, subsequently verified, that there were more to follow. For a long period the Chinese would accept no other foreign coin, and at Wuhu in the Yangtze, even to

this day, these coins duly 'chopped' form the currency, and carry a substantial premium above their intrinsic value.

The dollar of Charles IV. commanded for full eighty years a premium of at least 30 per cent. over a considerable stretch of Chinese territory—in fact, all that part of China easily accessible from the great river Yangtze. The adherence of the Chinese to custom is shown by their refusal to attach a similar value to the coins issued in the reign before or after that king.

When the Mexican dollar began to be introduced about sixty years ago, the Carolus dollar remained the currency of the foreign trade at Shanghai and in the Yangtze basin. In the time of the Taiping rebellion the premium on the Carolus dollar rose to 80 per cent. over its intrinsic value, owing to the reduction of Chinese imports. In order to put an end to the excessive appreciation of the coin the authorities declared officially each dollar on one given day to be the equivalent of one tael of silver, that is to say, 374½ grains of fine silver in the coin were to be legally exchangeable for 525 grains of fine silver contained in an ingot.

The Mexican dollar, bearing on the obverse the national emblem, an eagle perched on cactus and holding a serpent in its beak, hence styled the eagle dollar, has had a far greater circulation than its predecessor in favour. The reason for this has been that the area open to foreign trade has been ever extending. The earlier issues of this coin were not milled, but possessed what has been described as a 'rope' edge. These issues continue to maintain a free circulation in Northern China. In the south some of the succeeding issues are current, and are there chopped, or imprinted with a small die to indicate soundness. Mexican dollars are always needed for journeys inland, far from rail or waterway, and a traveller who intends to go a considerable distance requires pack animals solely for the carriage of his money. The latest issue of Mexican dollar, bearing an artistic representation of a female figure on horseback, is not at present current in China.

COINS.

Mexican dollar (rope edge); Mexican dollar (modern, current in Mexico); Mexican dollar (milled edge); Pillar dollar; Yuan Shi Kai; British.

(*p. 270.*)

Attempts have been made unsuccessfully by the United States of America, by France, and by Japan to introduce a foreign trade dollar for the sake of obtaining prestige. In all these instances the coins were made heavier than the Mexican in order to oust it from its position, but the innate conservatism of the Chinese, so long accustomed to the design and reliable quality of the latter coin, entirely routed the intruders.

Finally, the creation of an official British trade dollar was decided upon, primarily for the convenience of the colony of Hong-Kong.

The island of Hong-Kong, situated at the mouth of the Canton river, was first ceded to Great Britain by the treaty of Nankin in 1842; further portions were added to the colony in 1860 and 1898.

The importance of the colony is not to be measured by its size or population, but as the stepping-off ground for vast trade operations in the mainland of China. Hence British dollars possess a wide circulation, though one restricted to defined localities.

The position of Hong-Kong *vis-à-vis* with China has made a silver currency desirable, so long as the currency of China remains upon a silver basis, even though it is a British colony. The great Eastern banks who finance trade with China were therefore put in a position by arrangement with the British Government to provide silver currency, whenever rendered necessary by the balance of trade. The British dollar, first coined in 1895 at the Bombay Mint, is impressed upon the obverse with the figure of Britannia standing upon a rock in the sea, her right hand holding a trident and her left hand resting upon a shield, with a ship in the distance. The inscription includes the words 'One Dollar,' and the coinage year in figures. The design is surrounded by a Chinese ornamental border. The reverse impression is surrounded by a similar border, a scroll pattern with the Chinese labyrinth in the centre, and the value of the piece in Chinese and Malay characters respectively arranged crosswise within the scroll.

The British dollar and the Hong-Kong dollar, both

issued at the weight of 416 grains, and of the quality $\frac{900}{1000}$ fine, circulate in Hong-Kong as legal tender alongside the Mexican dollar, the standard weight of which is 417·74 grains and quality $\frac{902{\cdot}7}{1000}$.

British dollars, in addition to being legal tender in Hong-Kong, were legal tender in the Straits Settlements and are still so in Labuan. According to a government notification, dated Hong-Kong 30th March 1895, the above-mentioned dollars became legal tender to any amount, provided the coins were not dealt with in any manner prohibited by law, and had not become diminished in weight by wear or otherwise, so as to be of less weight than the least current weight which is fixed at 411 grains for British dollars, Mexican dollars, and Hong-Kong dollars.

According to actual practice, however, the Chinese will not take silver dollars for the full amount in settlement of payments. The Eastern banks state that very few dollars pass over the counter in payment of cheques, etc., as the Chinese much prefer, and usually succeed in obtaining, bank notes. They are much less troublesome to handle, and the notes of issuing banks have frequently commanded a premium over and above the actual silver coin which the notes represent.

When the British dollar was first coined in 1895, the seigniorage charge made by the Bombay Mint was fixed at 1 per cent., but was afterwards increased to 2 per cent. as from December 1903. The quantity of silver to be tendered at one time for conversion into British dollars must not be less than one thousand tolas in weight. The total amount coined at the Bombay Mint, from the commencement of operations in 1895 up to 31st December 1914, was as follows :

Official Year (from 1st April to 31st March).	British dollars coined.
1895 to 1904 inclusive	152,178,566
1905 to 1914 inclusive	65,681,719
Total struck from 1895 to 1914 . . .	217,860,285
1st April 1914 to 31st December 1914 .	nil.

The habit of 'chopping' dollars, i.e. the stamping of

the 'chop' on the face of the coin by some person considered qualified to verify its genuineness, may be considered at first sight rather foolish and unnecessary, but in the case of Mexican dollars it is generally looked upon by the Chinese as a necessary evil owing to the large number of doubtful and spurious coins of that kind in circulation.

The Mexican dollar is considered to be much more easy to counterfeit than the British dollar. The latter coin is of a superior finish, is of a more uniform size and has a better ring. These advantages protect the coin against imitation, and the disfigurement of the coin by 'chopping' being practically unnecessary, they are preferred 'clean.'

After the Russo-Japanese War a Japanese trade coin or yen was introduced into Manchuria. Contrary to the practice of the British Government, which coins British dollars for applicants of any nationality that may choose to send silver into the Bombay Mint, the Japanese Government only mints for those of its own nationality.

The exploitation of China as a field for mining has been slight hitherto compared with the possibilities of the country. Prior to the advent of railway enterprise, locomotion had been confined chiefly to the great waterways owing to the relatively small seaboard.

The great size of China and the difficulty of intercommunication has kept people of distant provinces almost strangers to each other, and has hindered collective efforts to enrich the country as a whole. Agricultural success, however great, may fail to benefit the labourer if he is unable to touch a larger market than that which lies at his own doors. It has been almost impracticable for the Chinese of mountainous districts distant from the great rivers—such localities as those in which minerals are usually to be found—to obtain a ready sale for weighty goods which might have to be carried upon pack animals for hundreds of miles before being marketed.

Meanwhile, development is retarded by want of capital. No doubt means will be available, either from native or foreign sources, when closer contact with Western civilisation galvanises China into life and activity.

CHAPTER XXVII

JAPANESE CURRENCY AND ART

A hoary dynasty—First silver discovery in Japan—Titles for coin saving—Export of precious metals to Holland—Debasement of currency in East as well as West—Marquis Ito and currency reform—The yen—Incontrovertible notes—Reduction to a silver basis alone—Effect upon Japan of closed Indian free mints—Resolute handling of crisis—Triumph for Finance Minister—New currency system based upon gold standard—British Government securities—Silver manufacture dating back to the first century A.D.—Bowl of eighth century—Silver plate rare but weapon ornament common—Blue blood and swords—Decline of Japanese craftsmanship—Production of silver.

THE present dynasty in Japan is asserted to have existed unbroken for 2400 years; the present emperor is the one hundred and twenty-third of his line. The emperor has always received semi-divine honours, and before the revolution was regarded as too sacrosanct to undertake the duties of government. He dwelt in practical seclusion from mundane affairs, and the chief exercise of his functions as emperor was to appoint a Shogun, who performed the actual duties of government until his death, when a successor was appointed.

There is considerable obscurity about the production of the precious metals in old Japan. It is stated that in the earliest times gold and silver were taken as of equal value, weight by weight. History records that silver was discovered in the island of Tsushima in the second year of the Emperor Teininu's reign (674 A.D.). No coins seem to have entered into general use until the Wado, or 'refined copper' era (708-715 A.D.), so called in consequence of copper deposits in the district of Chichi.

From the close of the seventh century a wave of mining industry spread over the country; silver was

JAPANESE SILVER WARE. (*p. 274.*)

found in many places and minted into coins. The ratio between copper and silver was then four to one. In course of time silver ceased to be current, and copper occupied the field for many succeeding years. The government found great difficulty in weaning the people from dealing by barter, and offered grades of rank to men who saved certain sums in coin. This seems a curious method of encouraging the use of coin, as these sums must have been accumulated by withdrawal from circulation. Communications with the adjoining great empire of China seem to have brought about some similarity in currency, and Chinese cash became the unit for Japan also.

It is a curious fact that silver was so scarce about the twelfth century that gold became the less valuable of the two metals, and was used profusely for the ornamentation of articles as diverse as bullock carts and temples. Toward the close of the sixteenth century, the era of Hideyoshi, one of Japan's great heroes, the production of the precious metals greatly increased owing to the introduction of scientific methods from Europe, and a great number of coins were minted. The silver coins were oblong and were known as the bu and half bu, namely ichi-bugin and ni-bugin. From this epoch, gold and silver coins formed part of the currency.

According to the following extract from *A History of Precious Metals*, by Alexander del Mar, M.E. (pages 141-3), the Dutch, the only Europeans with whom trade was allowed after the expulsion of the Portuguese in 1624, succeeded in obtaining very large sums of bullion from Japan during the ensuing hundred years:

'For the sake of the enormous profits which the trade yielded at first, they bore these conditions with fortitude, and for their reward managed to obtain more than £40,000,000 of the precious metals from Japan. Very little of this was procured before 1640, and only £1,200,000 after 1706, when through the medium of the artificial prices (in zenni) fixed by the Japanese upon their merchandise and the precious metals, the trade became unprofitable. This trade was active therefore,

during about sixty-six years, and yielded of the precious metals, on the average, about £650,000 per year.

'The Japanese were probably moved to this policy of restriction by the desire of terminating that slavery of the mines which had been greatly extended, if not indeed at first introduced, by the Portuguese; but in carrying out, the feudal state of the country, and respect for its powerful lords, obliged the native statesmen to assign a different reason in its behalf. This was the fear of exhausting the deposits of the precious metals. Says a memorial of the period: "A thousand years ago, gold, silver, and copper were unknown in Japan, yet there was no lack of necessaries. The earth was fertile, and this produced the best sort of wealth. Gangin was the first prince who caused the mines to be diligently worked, and during his reign so great a quantity of gold and silver was extracted from them as no one could have formed any conception of, and since these metals resemble the bones of the human body, inasmuch as what is once extracted from the earth is not reproduced, if the mines continue to be thus wrought, in less than a thousand years they will be exhausted.

'"Since these metals were discovered the heart of man has become more and more depraved. With the exception of medicines (European drugs) we can dispense with everything that is brought to us from abroad. The stuffs (cloths) and other articles are of no real benefit to us. If we squander our treasure in exchange for them what shall we subsist upon? Let the successors of Gangin reflect upon this matter, and the wealth of Japan will last as long as the heavens and the earth."'

Up to the time of the Revolution in Japan in 1868, which changed the constitution of that country from the Shogunate to the Empire, the monetary system had been more or less the same since the sixth year of Keicho in 1600 A.D. During this period the coins in circulation were constantly debased owing to the practice to which the Shogunate resorted whenever financial difficulties arose. Some of the Daimio governments (altogether two hundred and seventy in number) coined money secretly,

and most of them issued paper money to such an extent that the depreciation became extraordinary.

When the country was opened to Western trade, the grave inconvenience of this state of affairs became felt, but it was left to the new régime to reorganise the currency. In 1869 steps were taken to found a government mint, and to base upon the new metric system a new coinage in which silver was to compose the standard unit, and gold to be subsidiary. But, upon the receipt of a memorandum in 1871 from Mr. Ito (subsequently Marquis), the system was placed upon a gold standard; all gold or silver coins then current were called in, and the people were exhorted to hand over their hoarded coins to be reminted, and thus perform their 'heaven appointed' duties.

Though the one yen in silver was not really to form part of the new system (the highest denomination in silver being fixed at fifty sen or half a yen), yens or trade dollar coins were authorised to be minted for use at the treaty ports so as to circulate in exchange for, or alongside of, the Mexican dollar, which was at that time used universally in the East for money. The weight of these special yens was increased from 416 to 420 grains, with a view to oust the Mexican dollar, but the attempt then proved a failure. The existence, however, of enormous amounts of unconvertible paper drove specie, especially gold coins, out of circulation, and in 1878 it became necessary to make the old silver yen, as well as the new yen or trade dollar, legal tender. Thus the silver yen became the same legal value as the gold yen, and the system of currency became bimetallic. The enormous amount of paper notes began to cause serious inflation of currency, and prices rose rapidly; a false prosperity was experienced, and speculation became rampant.

Meanwhile gold and silver left the country, and great financial distress eventually set in. In 1880 the government sought to alleviate the crisis by increasing the amount of silver in circulation. The government sold silver coins, and opened places for the exchange of Mexican dollars, but without avail. The more these

methods were practised the more the value of silver rose, until the government realised the true situation, and bent its energies to render notes convertible. The redemption of bank and government notes proved costly but effective. The encashment was arranged in silver coin, and the result was to reduce the currency system of Japan practically to a silver basis.

The action taken by India of closing its mints in 1893 to the free coinage of silver, owing to the heavy fall in the gold value of that metal, reacted upon Japan. The exchange of Japan with India and with Western nations moved heavily against the former country, and fresh enactments became vitally necessary. Fortunately for Japan the Chinese indemnity became due in 1897, and the Chinese authorities were induced to make payment in pounds sterling, that is to say, in gold. This gold was turned, between July 1897 and April 1898, into 74,455,735 gold yen, and was held as reserve for the exchange of silver yen which began in October 1897 and ended in July 1898. The amount of silver yen thus exchanged for gold exceeded 45,500,000 out of a total coinage of over 165,000,000. The remainder, with the exception of about 3,000,000 yen, had been exported, and never returned.

By honouring promissory notes in gold, which had been issued against deposited silver to the nominal value of about 29,500,000 yen, the government had on their hands a total of about 75,000,000 silver yen. Of these 27,500,000 were recoined into subsidiary coins of lower quality, 40,800,000 were sold in China, 6,700,000 were disbursed in Formosa, Korea, etc., and the net result was a nominal loss of 5,400,000 yen, which was a little more than covered by the profit derived from the coinage on the subsidiary pieces. The whole operation was a triumph to the able minister of finance.

Japan is now practically a gold standard country, and the foreign exchange fluctuates only a mere fraction either way of par. The stability of the currency system is ensured by holdings by important Japanese banks of British Government obligations payable in gold, by the

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sale of which any tendency of exchange to give way can be arrested.

The industrial use of silver in Japan has not been relatively so large as that of many other nations, but it is worthy of special attention in consequence of a genius for artistic workmanship, its happy heritage from the past. The earliest examples, some of which date back to the first centuries of our era, consist of objects found in the burial-chambers of the Higo Dolmen period, such as a silver cap or kashira for one end of the grip of a small sword, and a band or fuchi for the other extremity. At a later date four swords, fitted with silver mounts with rings and broad bands of silver encircling the scabbard, were taken from the Musashi Dolmen. Hollow silver beads for a necklace, also finger rings and armlets, have been found belonging to the same period.

The earliest specimen of a large silver article seems to be a silver bowl seventeen inches across, the date of which was 767 A.D. The ornamentation of hunting-field scenes is an excellent example of nature mingled with convention common to early Chinese decorative art. From this time onward throughout the Middle Ages silver objects were not uncommon, but silver plate, as it is commonly understood, seems never to have been in general use, even in the palaces of the great. The cessation of the civil war in the seventeenth century gave great impetus to silver craftsmanship, especially of guards and other sword furniture. The feudal system in Japan gave special prominence to the sword, as an emblem of blue blood as well as a lethal weapon, and the beauty of silver ornament attached to the hilt and scabbard was sometimes extreme.

In the eighteenth and succeeding centuries numerous articles, which used to be made previously in copper or some other material, were fashioned in silver, and were often masterpieces of chasing and repoussé work, in no way inferior, either in beauty of design or delicacy of execution, to the best art work of earlier times.

It is to be feared that the advance of Western civilisation will not encourage the high level of

craftsmanship that existed in the past ages of Japan. Art lovers of every land show their appreciation of modern Japanese products, but specialise carefully upon those periods when the labour bestowed by the skilled Japanese workman upon his material was one of love rather than of monetary reward.

At one time the production of silver in Japan exceeded its domestic consumption. The production in 1918 was as follows :

Japan	6,600,400 ounces.
Korea	26,000 „
Formosa	26,900 „
	6,653,300 ounces.

COINS.

(*p. 281.*)

Rupee; Mahdi Dollar; Maundy Penny; Primitive Piece of Eight; Afghan Coin.

CHAPTER XXVIII.

BIMETALLISM

A joint basis for currency—Latin Union—Free mints—Mining discoveries—Franco-German indemnity—The Bland Act—Eastern trade—Gold debt—Fall in rupee value—Gold and silver productions—Ratio of production—Volume of trade—Cheques and notes—Loans—Restrictions of specie transit—Gold absorption by India—The Great War and gold—Increased coinage use of silver—International good faith—World Federation.

THE idea conveyed by the word Bimetallism is commonly understood to be the employment of two metals (gold and silver, for instance) as a joint basis for currency. In other words the mintage of two metals (both possessing a commercial value) in a fixed relation to each other at a certain ratio. As the ratio of the production of gold to silver has varied enormously at different epochs, and may continue to do so, and the commercial demand for one metal also varies independently from that of another, the determination of a fixed ratio between two metals as twin bases for currency is necessarily arbitrary.

An arrangement was made in 1865 between certain European States to form together what was called the Latin Union. The combination of States agreed to take such action as would practically maintain the ratio between gold and silver at 1 to $15\frac{1}{2}$. The financial standing and commercial importance of these States were so high, and the combined output of the two metals had so corresponded with the currency needs of the world, that the arrangement held good for a long term of years.

So long as a powerful group of nations, such as that which constituted the Latin Union, were prepared to assume the responsibility of absorbing whatever excess remained after the industrial demand of each metal was satisfied, other states could, if they so preferred, maintain a free mint for either of the metals. As a matter of fact, this was the case. Great Britain elected to keep a free mint for gold alone, and the great Indian peninsula a free mint for silver. The adjustment of the value of the metals through the Latin Union enabled the bimetallic franc, the silver rupee, and the gold sovereign to possess almost stable international values respectively of 9½, 25, and 240 pence.

The details of the convention to which the States composing the Latin Union arranged to adhere are outlined in the following extract from the *Principles of Economics*, by Dr. N. G. Pierson:

'On December 23, 1865, she (France) had entered into a convention with Belgium, Switzerland, and Italy —Greece did not join until 1868—for a uniform regulation of the currency. The following were the chief provisions of this convention, which was to enter into operation on August 1, 1866, and expire on January 1, 1880. The French currency of 1803 was to serve as a basis, subject to proviso, that all silver coins below the five-franc piece were to rank as divisionary money. The coins of the one country were not to be declared legal tender in the other countries, but were to be accepted by the Exchequer in the respective countries, so that they should become virtually current there. Each of the signatory States should be free to coin divisionary money up to the limit of 6 francs per head of its population, and such money should be legal tender for any sum up to 50 francs. The States that have signed the Convention form what is called the Latin Union. Spain does not belong to this Union, but in 1868 she regulated her coinage on the same basis as that of the Union.

'The system of the double standard was not maintained for long by the Latin Union. On January 31, 1874, the signatory States agreed that the coinage of

large silver money should be limited to a sum to be determined annually for each of them, and when on November 5, 1878, they resolved to prolong the convention for a period of six years, they agreed that the coinage of large silver money should be entirely forbidden within the Union. We need not mention the further measures subsequently agreed to by the Union from time to time. These deal with the rights of the respective States as regards their own silver money, and the question of the divisionary coinage. What chiefly concerns us here is that the agreement of 1874, and more definitely that of 1878, involved the abandonment of the double standard, a measure which had been adopted in England as early as 1798. There too the double standard had been in operation, and silver had been supplanted by gold. As soon as there was a danger of gold being supplanted by silver, England like the Latin Union, adopted means to prevent it.'

Several events, however, combined to disturb the equilibrium of the two metals: important discoveries of gold were made in California and Australia, the existence was proved of vast silver deposits in the United States of America, and the Franco-German war.

Had one only of these events occurred, the effect upon the currency systems of the world would not have been so radical, for a certain amount of metallic currency is necessary to discharge external and internal indebtedness, and the composition of the metal is really immaterial provided it be of permanent international acceptance.

The huge indemnity obtained by Germany from France gave her the power to remodel her currency, and to demonetise silver in 1873. By this means she hoped to involve France in difficulties, and to cripple her power to recuperate. The expectation was not realised, for the genius of France, and the devotion of her people to their country and their cautious and saving habits, gained a financial victory over the subtle designs of her foe.

It is a curious circumstance that the quantities of silver coined by the Latin Union since 1866 correspond approximately to those of the silver reserves held by

the central banks of the Latin Union at the beginning of 1896, as will be seen by the following table:

Quantities coined.		Bank holdings.	
France (1866-78)	£25,000,000	Bank of France	£49,480,000
Italy (1866-79)	14,360,000	Belgian National Bank	800,000
Belgium (1866-76)	14,000,000		
Switzerland (1866-1876)	320,000	Bank of Italy	2,120,000
Greece (1866-76)	600,000	Swiss Banks	480,000
	£54,280,000		£52,880,000

Silver, however, had been dealt a deadly blow, and succeeding years recorded defections on the part of one country after another from their allegiance to silver as co-regnant with gold.

The United States of America, whose prosperity became in course of time allied closely with silver-mining, sought to stem the tide of disaffection by undertaking to coin annually a large number of silver dollars.

Dr. Pierson in his *Principles of Economics* thus describes the subsequent action taken by that country:

'The result was the acceptance, on February 21, 1878, of what was called the "Bland Bill," whereby it was declared the duty of the Government to cause to be coined every month not less than two million and not more than four million dollars silver of the same weight and fineness as the previous dollars, furthermore to arrange with the Latin Union and other countries for the holding of a Monetary Conference, intended to bring about the international adoption of the double standard on a uniform basis.

'The Monetary Conference took place in Paris in 1878, it was followed by a second in 1881, and by a third at Brussels in 1892. None of these gatherings led to anything, nevertheless, the United States Government persevered in the course on which it had entered. The law of 1878 was replaced on July 14, 1890, by the Sherman Act, which entailed a further and considerable increase in the purchases of silver. The silver coinage provided for in the previous laws demanded a minimum

of 18,559,000 ounces, and a maximum of 37,118,000 ounces of silver per annum, but now 54,000,000 ounces, or nearly three times the minimum of 1878, had to be purchased annually. The total purchases of silver by the United States Government under both laws amounted to 429,000,000 ounces. The silver production of the whole world for the years 1878 to 1893 is estimated to have been 1,704,000,000 ounces, so that the effect of the Bland and Sherman Acts was to create an artificial demand for just about one-fourth of this production.'

So large, however, did the stock of silver grow that the authorities feared lest the difference between the intrinsic and the nominal value of the reserves against notes would present a measure of danger, and undermine public confidence at home and abroad. The Act was therefore repealed in 1891; thereupon the point of interest with regard to silver currency shifted from America to the East. Visible supplies continued to augment, swollen not only by the increase of production, but also by the proportion hitherto retained for American coinage. Failing absorption elsewhere, the whole of the silver discarded as currency by other countries poured into India and China.

The stimulation of the trade of these countries was enormous; their commercial products rose continuously in value as measured in rupees and in taels, and to all appearance wealth grew by magic. No permanent prosperity, however, can be derived from an inflation of currency. Excess of the circulating medium over and above the actual needs of the people, unless corrected in time, leads to disaster. This was especially the case with regard to India, for a great yearly sum ranging between £15,000,000 and £20,000,000, calculated on a gold basis, has to be remitted to Europe on account of the expense of government, loans, etc. Obviously the more rupees paid for the pound sterling, the more heavily does taxation press upon India, the population of which has but a narrow margin available for taxation, owing to climate and other causes.

The rupee dipped on 23rd January 1895 to 1s. $0\frac{13}{32}$d.

(the rate tendered for Indian Council Bills) as compared with 2s. 1d., the normal rate, and the burden of taxation rose in proportion. Knowing the danger of waiting until the transient prosperity begotten of inflated currency had evaporated, the Government took the bold step of closing the Indian mints to free coinage in 1893, and the rupee was brought gradually to a sterling value of 16 pence, or 15 rupees to a sovereign.

Such, simply stated, is the history of the transition from Bimetallism to Monometallism.

The real cause of the changed policy of nations in regard to silver was that the joint production of the two precious metals (especially due to the production of gold following the exploitation of new goldfields) was increasing at too rapid a rate for these metals to be absorbed for currency purposes. The output of gold, for instance, has increased from £23,000,000 in 1873 to £98,000,000 in 1912—that is, over 300 per cent., whilst the total output of silver has risen from 63,000,000 ounces in 1873 to 229,000,000 ounces in 1912, or 255 per cent. When it is remembered that these huge increases were almost coincident, and that the amount of money coined should be limited to the world's requirements so as to avoid inflation, no surprise need be felt that silver—the less precious metal—the handmaid, as it were, of the household—was pushed to the wall.

A subtle change has set in with regard to the use of the metals in consideration, due doubtless to a circumstance that possibly has not attracted the attention which it deserves, namely the ratio of production between the two metals. When the ratio for a series of decades is placed in juxtaposition, the result is very suggestive. The following figures show the ratio of silver production to that of gold at different periods:

1860	$4\frac{1}{2}$	to 1
1870	7	„ 1
1880	15	„ 1
1890	22	„ 1
1900	14	„ 1
1910	10	„ 1

It was this increasing ratio between the production of silver and that of gold from 4½ to 1 in 1860 to 22 to 1 in 1890—a ratio out of all proportion to the use of silver for industrial purposes—which threw a burden upon its use for currency intolerable for nations to bear without fresh and limiting legislation.

It is not proposed to discuss here whether a return to bimetallism be advisable or feasible, but a few data and suggestions regarding the subject may be found useful. In the first place, great changes have taken place within the last few decades in the position which cheques occupy as media of exchange. The volume of international business, and the activity of internal trade, have grown enormously, and it is extremely difficult to correlate their relation to currency. Whether extension in the use of cheques and drafts, which act as currency, exceeds the increase in trade, is a moot point.

Again, the amount of money loaned from lending to borrowing countries desirous of raising funds for their development, has increased by leaps and bounds. These loans, be it observed, are to some extent paper money, for they can be, and frequently are, set off by a transference of funds directly or indirectly upon paper. All such ways of financing foreign engagements tend to diminish the need for metallic remittance, and to render a comparison of the world's combined production of the precious metals at different epochs extremely valuable, for the operation of placing a foreign country in funds in the days of the Tudors, for instance, meant the remittance of an actual sum in bullion. Any such expedient as paper, representing goods to be received through some third, fourth, or more parties, was not then available. The aim of modern finance is to minimise the transit of specie from one country to another as a method of payment, and also to avoid wasteful wear and expense of coin within a country, by the use of cheques and notes instead of gold and silver.

The prosperity of India has been increasing upon such a scale that that empire has absorbed gold heavily in the years prior to the Great War; at the same time

the output of gold seems, for the present, to have reached its maximum. Moreover, the importance of gold, as a war rather than a note reserve, has been shown plainly by the course of events during the recent world-wide conflict, and it is quite likely that the Great Powers will encourage a certain accumulation of gold in excess of trade and actual currency requirements.

It is quite possible that silver will emerge from its day of humiliation.* The day of bimetallism appears to be gone, and few would venture to suggest its revival as a remedy. The day is still far off when nations can agree to substitute paper credits alone in settlement of trade balances. Gold will always be in request for such a purpose, but some relief in the currency demand for this metal may be sought in a more extended subsidiary use for silver, and it is possible that governments may consider in the course of time the advisability of minting silver coins subsidiary to gold on a much larger scale, and to raise the amount for which silver coins are legal tender.

Any bimetallic arrangement would have to include Asia, as well as the other continents, but it should be remembered that individual nations always will consider their own interests first, and that any agreement between East and West to preserve open mints for both metals could only remain valid so long as it did not conflict with vital interests. A World Federation is not yet in sight. Till that time arrives, any such convention with regard to a world currency is liable to be abrogated by one or more of the contracting parties, and the action may entail serious embarrassment upon the remainder.

* The price of silver has risen greatly since the above was written, but the scarcity of silver after the war suggests an increased use of nickel and paper as subsidiary money until the world's production increases. By that time perhaps the world may have become too much in love with the substitutes to wish for silver coins.

ARRIVAL AT BOMBAY MINT.

(*p. 289.*)

CHAPTER XXIX

SILVER AND WAR

Silver deposits a cause of strife—Ancient Carthage and Spain as concrete instances—Outbreak of Great War in 1914—Effect upon silver—Closure of market for full week—Restriction of credit—Enemy contracts—German sales against ore—Low price in November, 1914—Small losses through submarines—Extraordinary British coinage demand—Its cause—France, Holland, and Russia similarly affected—Difficulties of latter—Coinage needs of Egypt, Mesopotamia, and East Africa—Falling Indian reserves—Indian speculation—Phenomenal rise in prices—Coins for sale—Notes of small value.

HISTORY records that many wars have been waged for the acquisition of metallic wealth, either for an indemnity or for the possession of mines. Amongst those with the latter aim may be enumerated the campaigns of Hamilcar and Hannibal in Spain, Caesar in Gaul, Cortes in Mexico, and Pizarro in Peru. In many cases great cruelties were perpetrated upon the unfortunate aborigines who inhabited the neighbourhood of the mines, whilst the invaders suffered defeat in their turn from other nations. Indeed, the very possession of mines, by sapping the moral and physical force of their possessors, frequently led to national decay, of which Carthage and Spain are striking instances.

The following extracts are taken from *A History of Precious Metals*, by Alexander del Mar, M.E.:

'Meanwhile Carthage kept up her trade with the Orient, and through this source disposed of a portion of her metallic wealth. The profits of this trade, coupled also, perhaps, with the appearance of Carthaginian silver in Italy, excited the cupidity and envy of Rome, and led to the first Punic War, which began 264 B.C. and ended in 241, Rome obtaining the islands of Sicily, Sardinia and Corsica, all of them mining countries, and 1200

talents of indemnity from Carthage; terms of peace that indicate the object of the war to have been the acquisition of the precious metals.

'That the Spanish mines were the cause of the fall of Carthage is as little to be doubted as that the American mines occasioned the ruin of Spain. They corrupted the government of Carthage, and led to the neglect of military discipline and precautions; they introduced a mercenary and gambling spirit into all enterprises, they created monopolies of wealth; they impoverished the masses; they occasioned the abandonment of those industries which had built up the State, and they eventually so crippled its power, that in the memorable contests that were to ensue with Rome for the mastery of these same mines, Carthage was unable to successfully cope with its more vigorous adversary.'

War on a large scale has always affected greatly the precious metals. It has injured the mining industry and retarded production, and has appreciated their value, as expressed in commodities, in consequence of the demand for metallic currency as the sinews of war.

The effect produced upon the market and price of silver by the outbreak and continuance of the Great War merits more than passing attention for many reasons. The occasion was unique, for the catastrophe was unparalleled, both as to the immensity of the area and the number of the population involved. Never had the world's trade been so disorganised, or had the relations of so many nations engaged in apparent harmony been severed so suddenly.

During the first seven months of 1914 the silver market had been of a steady character. The price had ranged in the neighbourhood of 26 and 27 pence per ounce standard. The swift approach of the world crisis arrested demand, and the quotation sank rapidly to $24\frac{1}{16}$d. before the close of the fateful July. On 31st July and 1st August the situation had become so serious that it was not practicable to fix a quotation. As Monday, 3rd August, was a Bank Holiday, and the banks were closed officially on the three succeeding days, no quotation

was fixed for a full week from Friday, 31st July, to Thursday, 6th August, inclusive. Thus the period which it is proposed to review was ushered in by a closure of the market for a record length of time.

The custom of fixing two daily prices, one for delivery within seven days, and one for delivery in two months, was at once abrogated for two reasons, namely—the absolute necessity of restricting credit in the extraordinary circumstances that obtained, for, at the outset, no one was in a situation to judge how another might be affected by the abnormal position of affairs. At a moment when the very foundations of mutual confidence seemed in risk of being imperilled, credit withered at the root. Further, the power to fulfil future engagements to deliver silver seemed problematic, owing to a natural doubt as to what the future might hold in store.

Reluctance to grant undue credit continued throughout the duration of the war, because, when the first shock had abated, an instinct of caution engendered by such grave occurrences advised the restriction of anything which might give rein to wild speculation. The wisdom of this course was justified by events.

One of the first steps taken was to close all enemy accounts. The silver market in Germany itself was always comparatively small, and a difficulty was found there in covering by forward sales the silver which was extracted ultimately from silver-bearing ores purchased by German smelters from Mexico and elsewhere. Refineries at Hamburg and Frankfort were in the custom of purchasing freely low-grade ores, discarded by smelters in Great Britain and America. It had been their custom to make covering sales in London, and buy back the silver as the silver was recovered from the ores. The local production of silver in Germany, though considerable, did not suffice by any means for the active trade then carried on with Russia and other adjoining States. For this reason the purchase of silver in ore or otherwise was a frequent necessity to Germany. At the outbreak of war outstanding contracts were closed by the purchase or sale of identical amounts of silver.

The stock in London was rather small in the early days of August 1914, only about £500,000 in all. The pressure arising from these forced purchases in a market ill supplied for so sudden a demand, drove the quotation to 27¾d. during the three working days between the 7th and 10th of August.

Spasmodic inquiries set in from several neutral Continental mints, as well as a steady demand for home coinage, but the cessation of all demand from the Indian bazaars—the great and constant customers of this market—for no less than nine weeks, and the disorganisation of the manufacturing trade, more than offset the demand for coinage. Moreover, the United States and Mexico, nervous at the prospect of losing the realisation of one of their most profitable industrial products, hurried supplies into the market, with the result that on 13th November the price dipped to 22⅛d., only $\frac{7}{16}$ above that fixed on 4th December 1902—21$\frac{11}{16}$d.—which was the lowest ever recorded.

The restraint imposed by war conditions and the absence of a price for forward delivery, rendered the market somewhat lifeless for the succeeding twelve months. Notwithstanding that demand for coinage remained persistent, the price remained at a fairly low level, nearer 23 than 24 pence per ounce standard.

In the middle of November 1915 a careful calculation of the stock in London proved it to be much smaller than anticipated, and a revival of Eastern demand set in as a consequence, which gave vigour to the market, and raised the price a few pence.

One interesting feature of the market during war time was the way in which the transit of silver was affected by the new conditions. Most of the consignments from America were carried by American ships, but this fact did not prevent great increases in insurance rates. Losses through submarine warfare, however, proved trifling compared with the large shipments successfully landed.

Another feature, certainly the most important, was an extraordinary demand for silver for coinage. During

the first two years of the war, about £15,000,000 of British silver coin (face value) was issued; that is to say. about three times the amount that would have been coined in a similar period during normal times.

The cause was twofold. The necessity of husbanding gold for the purpose of liquidating external indebtedness, and its disappearance as a consequence from internal use, created a demand for currency smaller than Bank of England bank-notes, which the emergency issue—styled Treasury currency notes—failed to fill. Again, the circulation of currency flowed in absolutely new directions. Wherever training camps were set up for the new armies, new centres of population were created. Villages which heretofore provided a humdrum existence for a few hundred people, whose wants were met by £25 or £30 worth of silver coin, became suddenly the vortex of 40,000 or 50,000 men, who, though possessing individually only a few shillings to spend, had to be paid weekly in a lesser denomination than a ten-shilling currency note. Their quartermasters also required abundance of small cash for such marketing as had to be transacted locally. Where £25 of silver coin once sufficed, it is no exaggeration to say an amount of £1000 was not nearly enough. When it is recollected that these new centres of population arose like mushrooms, often in the most out-of-the-way parts of the country, no surprise will be felt that the demands of the Mint assumed huge figures. Nor was this state of affairs confined to Great Britain alone—France was faced with the same difficulty, and so was Holland, flooded by an unexpected inundation of Belgian refugees. Russia suffered from the same urgent need, but found obstacles in the way of supplying her wants, owing to her geographical position, which did not lend itself to ready communication with her Allies. Four sea routes obtain in normal times—via the Baltic ports, via the Black Sea, via Archangel, and via Vladivostock. The exigencies of war left only the last two open. Of these Archangel was closed a considerable portion of the year with ice, and Vladivostock demanded a voyage of two months or more

duration. Moreover, both routes became congested with other and more pressing consignments. It was not infrequent for goods to take eight months or more to reach Archangel from British ports. Japan, however, not only supplied Russia with munitions, but also coined large quantities of small silver coin for her Ally. Another difficulty confronting Russia was her adverse exchange, which added 40 per cent. or 50 per cent. to the cost of her purchases, and would have made the expense of coining silver almost prohibitive, were it not for the practice in Russia to coin small silver pieces of the quality of 500 parts in the 1000 fine, as compared with the 900 parts in the full rouble.

The smallness of the London stock to which allusion has been made, focussed attention upon silver as a commodity worth some speculative interest, and introduced competition for the supplies, which speedily became translated into rising prices.

As yet, only the local British demand has been mentioned. The extension of the area of war to other fields brought about similar need for small change. A large army was accumulated in Egypt, largely of Colonial troops, who were better paid than other soldiers, and spent their money freely. The supply of piastres ran short, so much so that the Indian rupee was authorised as legel tender at the rate of fifteen to the sovereign, as in India itself. The presence of contingents of Indian troops—revelling in the congenial atmosphere and surroundings of Egypt—added to the suitability of the measure. Rupees also circulate in East Africa, where increasing numbers of Indians have been settling for trading purposes during recent years. The extension of the war to this locality at once caused the usual shortage of small change.

The expedition to Mesopotamia commenced with small numbers, but rapidly grew in size. The proportion of camp followers to an army in Eastern lands is very great. Purchases from local Arabs had to be in coin, and that coin was necessarily the rupee. Wealth entered the country as it had never done before, and the

silver coin of which it was comprised flowed toward the interior and did not return.

Within India itself a partial cessation of the customary influx of sovereigns threw more responsibility upon the stock of silver rupees, which were diverted to fresh areas within India by the movements of troops in some such way as, to a lesser degree, silver coin circulated within Great Britain itself.

The effect upon the reserves of silver rupees in India was prodigious. On 15th August 1914 the stock held in the Indian treasuries was 3776 lacs; on 7th May 1916 the total had fallen to 1815 lacs. A drain upon the treasuries is customary at certain periods of each year, owing to the cash required for financing the harvests. This customary movement concealed for some time the fact that the drain of silver rupees, swollen by war demands, for Egypt, East Africa, and Mesopotamia, often exceeded 30,000,000 rupees in one month, a sum representing over 10,000,000 ounces of fine silver. So large a monthly efflux of coin was not likely to continue indefinitely, unless the number of troops and the area of the campaigns increased, because the localities would gradually become saturated, as it were, with rupees. Still, a very large proportion of this imported silver wealth was not likely to be repatriated, so far as Mesopotamia was concerned at any rate, but was sure to penetrate throughout adjoining countries whence supplies were drawn. The novelty of an abundance of reliable silver coin would appeal to traders far and wide. Hence the augmentation of the stock of silver rupees in India and the provision for a continuance of external demand, rendered purchases for the Indian Mint an urgent necessity. The matter was the more pressing because the internal requirements of India would, in any case, have had to be considered, as the monsoon was a good one; this demanded, by the way, not only silver in a coined form, but also uncoined for sale to the up-country bazaars, there to be worked up into bangles and other wares.

Indian bullion merchants were not slow to gauge the situation. They were aware that several European mints

were in the market more or less constantly, and they foresaw the addition of a buyer, their own mint, which would not dare to be intermittent in its purchases, for its requirements for the current year might even amount to 20 or 30 crores of rupees, in other words, 70,000,000 or 100,000,000 ounces of silver, an amount almost impossible to be secured out of a production in the neighbourhood of 200,000,000 ounces.

Quick in action, the Indian bazaars began to anticipate affairs by buying silver, with the result that their competition with the several mints drove the price from $32\frac{1}{16}$d. to $37\frac{1}{8}$d. in six days, in the course of which the quotation twice leapt $1\frac{1}{8}$d. in a single day.

The situation was becoming a grave one for the Indian Government, because the coining value of the rupee is only 43·06 pence the ounce. Had the price continued to mount above that figure, say to 45 pence, the Indian people could have shipped rupees to London, melted and refined them at a profit. The problem of supplying India in time of war with suitable exchange for such bullion consignments would have been extreme.

As might have been expected, the high price caused the export of large quantities of silver from China, blocks of which were sold to the Indian Mint and blunted the appetite of the Indian bazaars. Some of the overflow even found its way to London, but the bulk was dumped at the ports of India, the nearest and most economical market owing to the cost of freight, insurance, and interest during transit, being less than shipment to London.

Another phenomenon arose from the high level to which the price had attained. Certain silver coins became worth more dead than alive owing to the intrinsic exceeding the nominal value. Amongst these figured Manila dollars, considerable sums of which were sold by the Manila authorities to China at a substantial profit, and Maria Theresia dollars, the staple currency of the Arabian peninsula; large quantities of the latter coin were realised in Bombay and also in London. The consignment of this exceptionally fine coin, struck

perennially in the Austrian mints from the old die dated 1780, bearing the bust of the female sovereign whose name the coin bears, seemed an act of vandalism. Bombay received an influx of other coins from other states in Asia, such as Afghanistan. Had it not been that the civil strife in Mexico had denuded that country of coin, the Mexican dollar would also have been for sale. The tapping of fresh supplies checked speculation for a rise, and brought the market more in favour of the purchasing mints, which, taught by experience, sought to avoid ruinous competition for the supplies. However eager individual mints might be, it was no more possible to anticipate the future output of silver than for a farmer the laying power of his fowls. The price fell back to 30d., but recovered ultimately to levels considerably higher.

The result of massing troops and moving them abroad was extremely remarkable. The pressure for coinage was unique, and the fact that silver coins were more profitable dead than alive was remarkable. Demand for coin was rendered somewhat less urgent by the issue of notes of small value; these ranged down to 25 centimes or about twopence in France, and in Russia to 1 kopeck, which, at time of issue, was worth only one-seventh of a penny.

CHAPTER XXX

THE AFTERMATH OF WAR

Shrinkage of production—Mexican currency reform—Huge transfers of silver from China to India—Restrictions upon exports from U.K. —Sale of U.S.A. melted dollars under Pittman Act—Fixation of maximum price—Record quotations since 1833—Rise in sterling value of the Rupee.

Since the publication of the first edition of this work the difficulties recited in the preceding chapter became more acute, and the history of the metal was constantly punctuated by fresh record prices. Meanwhile the production somewhat increased owing to the encouragement given by the improved value of silver to the mining industry, and to the more satisfactory condition of affairs in Mexico, where civil strife and a lack of cohesive government control had recently rendered persistent and unhindered production of silver only possible in the neighbourhood of the great cities. (In fact the Mexican output fell from 80,000,000 ounces in 1911 to about 30,000,000 in 1917.) Some progress was obtained in the reformation of the Mexican currency system, of which the metallic money (gold and silver) had almost entirely disappeared from circulation. This step naturally still further straightened supplies by an absorption of silver in Mexico itself, and thus assisted in raising the value of the metal.

The rising prices led to immense exports of silver from China, and the fact that very large consignments shipped to China often recommenced their travels before they became merged into China stocks makes it very difficult to estimate the actual transfers from China to India. However, it is fairly safe to assume that a total of about 100,000,000 ounces was moved from one country to the other during the years 1916-1918.

HANDLING SILVER BARS IN CHINA. (*p. 298.*)

In May 1917 the Royal Mint here, as well as the similar institutions in France, Russia and Italy, were keen buyers owing to the mounting prices of commodities and the consequent demand for small change. The Allied Governments, faced by a silver market moving rapidly beyond control, had agreed previously in May 1916 to pool their purchases, or rather had undertaken not to compete against each other.

The United States came into the War in April 1917, and as a consequence was also compelled to increase its domestic coinage in due course.

This constant and unsatiable demand now led to the commencement of successive restrictions being placed upon dealing in silver. The Indian Government forbade the import or export upon private account, and Great Britain vetoed shipments to Scandinavia and Holland. This did not cause a cessation of demand from the last named country, for the Dutch Mint lent silver to Dutch silver manufacturers—in order to prevent closing down of these industries—provided the silver was certified as having been bought and held in London.

The gourmand, however, was India, into whose capacious maw was drawn the balance of production and every available stock throughout the world, save the reserves absolutely vital to the maintenance of China's internal trade. Nevertheless, like Oliver Twist, India asked for more, and, more fortunate than Oliver, obtained it.

As already indicated in other chapters, it has always been extremely important for the United States of America to encourage the mining industries within its territory, whence the precious metals have been produced year by year in increasing quantities, silver having ever held the most important place as to quantity. It will be remembered also that the silver value of the rupee at 15 to the sovereign is equal to 43·06 per standard ounce, and therefore, when the price of the metal rose toward the close of the year to 43½, the foreboding of the Indian authorities became translated into unpleasant reality. Rumours that the United States was about to

take some drastic action, such as commandeering the output of America and fixing a selling price of a dollar the ounce speeded the quotation to $45\frac{1}{8}$ in January, but no immediate steps being taken, there was some slight reaction.

Large reserves of silver dollars had been accumulated in the United States—to the extent of $450,000,000—against which silver certificates were issued. The United States has always taken kindly to the use of paper money, and this huge store of the metal, now in such request, lay practically dead in the vaults of the U.S. Treasury.

In order to assist in solving the Indian currency problem, an Act, named after its proposer the Pittman Act, was passed by the U.S. Congress in April 1918 by which was authorized the sale of $350,000,000—part of the reserve of abovementioned silver dollars. The provisions of the Act may be thus summarized :—

The aim was to conserve the gold supply of the United States; to permit the settlement in silver of trade balances adverse to the United States; to provide silver for subsidiary coinage and for commercial use; to assist Foreign Governments at war with the enemies of the United States, and for the above purpose to stabilize the price and encourage the production of silver.

Not more than 350,000,000 U.S. silver dollars were to be melted or broken up, and sold as bullion at a minimum of a dollar per ounce, 1000 fine. Immediately upon sale the Director of the United States Mint was to be directed to purchase in the United States, of the product of mines and of reduction works in the United States, an amount of silver equal to 371·25 grains pure silver in respect of every standard silver dollar so dealt with, at the fixed price of one dollar per ounce 1000 fine. Such silver could be resold for certain specified purposes, but any balance not thus resold, whether coined or otherwise, was to have silver certificates issued thereagainst. Purchases were to continue until the equivalent of the melted or broken-up dollars was acquired.

One dollar per fine ounce at the exchange of $4·874—which is the par of 77s. 9d. and $20·6718 the buying

prices of gold for coinage in the United Kingdom and the United States of America respectively—is equal to 45·54d. per standard ounce. This figure, so long as the Pittman provision of repurchase is unrepealed, seemed likely to be the bedrock price of the metal for many years to come, since the United States was not likely to be a seller except at above that figure.

The next step was to fix a maximum market price. This was done by agreement between the Governments of Great Britain and the United States by a mutual arrangement imposing a limit, determined by the U.S. maximum of 100 cents per fine ounce (raised in August 21 to $101\frac{1}{2}$ cents) calculated at the exchange between the two countries plus an allowance for cost of shipping to this country. As the American exchange was 'pegged'—that is to say, controlled at a fixed rate—movements only took place in accordance with official changes. As a consequence of these drastic steps only these successive prices were recorded: May 2, 1918, $49\frac{1}{8}$; May 13, $48\frac{7}{8}$; August 9, $48\frac{13}{16}$; August 21, $49\frac{1}{2}$; November 12, $48\frac{3}{4}$; December 6, $48\frac{7}{16}$; February 11, 1919, $47\frac{7}{8}$; February 20, 1919, $47\frac{3}{4}$, until May 9, 1919, when the embargo was removed.

As soon as the market regained its freedom, the price rose instantly to $53\frac{1}{2}$ and further to 58 on May 11, after which a considerable set-back occurred. In September, however, a fresh advance began which carried the quotations to figures that exceed all known records since 1833, when statistics first began to be systematically recorded.

The Indian Government, reluctant to make radical changes in its currency system that would have enabled it to avoid fresh purchases of silver—such as a reduction in the silver contents of the rupee, the substitution of another metal—nickel for instance—as the material for this coin, or the rendering currency notes temporarily inconvertible—decided to raise the rate of India Council allotments whenever an increase of the price of silver made it unprofitable to mint rupees at the enhanced rate.

As a result of the rise in silver prices the sterling value of the rupee was raised from 1s. 4d. as below :

	s.	*d.*
August, 1917 . . .	to 1	5
April, 1918	to 1	6
May, 1919	to 1	8
August, 1919 . . .	to 1	10
September, 1919 . . .	to 2	0
November, 1919 . . .	to 2	2
December, 1919 . . .	to 2	4

At the time of writing the position of the silver market is so dependent upon Far Eastern demand that it would be foolish to set a limit to the figure to which the price of silver may not soar. On January 29, 1920, it touched 85. Naturally, every effort has been made by American silver producers to make the most of the extraordinary situation—Mr. Pittman, who gave his name to the Act which authorized the melting and sale of the $350,000,000, held in reserve against silver certificates in the United States, rightly had prophesied a rise to $1·29 per fine ounce in that country (the rate above which the American dollar will cease to be profitable to coin and begin to be worth while to melt). The rise of the price of silver several cents higher did not embarrass the United States, for the amount of silver dollars in circulation has of late years been far from large—the greenback being preferred for general use. At the normal exchange between the United Kingdom and the United States, say 4·86, the equivalent of $1·29 per fine ounce, without allowing for the expenses of transit from one country to the other, is slightly under 59d. the standard ounce, but the adverse exchange with the United States in January 1920 rendered the cost, calculated in British currency, over 44 per cent. higher.

The release of official control over the gold production of the British Empire brought about a change in the intensity of the Indian demand for silver coinage. A rate had been previously fixed at which the Indian Government was prepared to sell rupee remittances in exchange for gold in America to American merchants,

with whom Indian raw products were in very great request. The opening of a free market for South African and other gold mined in the British Empire enabled some to be sent on Government or on private account to India. The Indian authorities purchased gold privately imported at certain rates (11 rupees 11 annas per sovereign was the rate ruling in October, 1919), and placed the metal in its reserves against the note issue, where it was calculated at 15 rupees to the sovereign. At the time these remittances were first transmitted the price of gold in the Indian Bazaars was about 33 rupees per tola fine ($\frac{3}{8}$ of an ounce) as against the normal pre-war rate of 23 rupees 14 annas 4 pies. In order to reduce the premium and also to meet the keen desire of the native population for gold, the Indian Government offered a certain quantity for tender in successive weeks, and the price rapidly fell to about 27-28 rupees: thus the Indian Government made a double profit upon gold imports. This policy has had the effect of ameliorating the Indian currency difficulties which were the original cause of the phenomenal rise in the price of silver. It became evident that a moment eventually would arrive when the Government would have the power to cash notes in gold and be fairly confident that the gold would not all disappear into native hoards.

The Indian pressure being over, there set in a demand from the distant East, which had been denuded of so much of its currency by shipments to India, that some replacement became necessary owing to the activities of internal and external trade. It is true that the high price of silver made gold seem cheap to the Chinese, and large gold imports were made from the United States, but the latter metal is rather a commodity than currency, and no real substitute for silver in China.

The enquiry found a market without silver stocks, and producers unwilling to sell. The demand was not entirely from China proper. It arose in the heart of Asia, where, in the days before the War, rouble coins and rouble notes had been the medium of exchange. The collapse of the Great Colossus so destroyed credit

that Russian Notes became barely worth the paper on which they were printed; indeed over vast tracts of Asian territory nothing but silver—coin or sycee—was accepted as money. The Great War shattered many European currency systems. When its reverberations rolled far up the lone Asian steppes, what wonder if Mongolian and Siberian peasants declined to part with their simple wares except against payment in hard cash?

Even in China itself the notes of native banks fell to a heavy discount, and the Nanking and other mints worked at full pressure to coin dollars.

The prices at which silver coins (full weight *loco* London) can be profitably melted at the normal pre-war exchange are of interest owing to the record value of silver:

United States dollar . . .	58·9d.
Dutch 2½ guilder . . .	60·45d.
5 franc piece and similar coins .	60·87d.
Sterling Silver	66· d.
German mark	67·3d.

Great quantities of the last mentioned coins have been melted and realised in 1919-1920. Melting of any *current* silver coins is prohibited in the United Kingdom at the present time.

The effect upon our own currency system, should the price long exceed 66d., may be to introduce the five shilling notes which have been printed to meet such an emergency; whilst throughout the world similar and other expedients will be adopted in preference to minting silver, now that supplies have failed entirely to meet the demand. The abundance of emergency money—in base metals, in cardboard, and in small notes, which have been issued in France, Germany, Belgium and elsewhere, have demonstrated that silver is by no means an absolute necessity for subsidiary currency.

In all probability the populous and comparatively poor population of the East will control the future of silver, which for many years to come is likely to be much rosier than its most fervent admirers would ever have dared to suggest before the advent of the Great War.

CHAPTER XXXI

SILVER AND PRICES

Summary of matter under consideration in previous chapters—All point to change, save one factor alone—Prices based upon silver have constantly varied—The Good Samaritan's pence—Wealth not measurable by money—Mediaeval housekeeping—Increased production of precious metals raises prices—China practically the only currency based upon silver—Remarkable variation in the value of silver compared with gold—435 degrees—Yearly variation since bimetallism abandoned by Europe—The evil effect of cheapness upon the workman—Matter and spirit—The future of silver.

In previous chapters a field has been traversed, vast, whether measured by time or by the space covered upon the earth's surface. The mind has been directed to those distant aeons which preceded the count of time, before the terrestrial globe became in a condition to form a home for man. A period of many thousand years of his activities has been reviewed, and then, with the aid of the Apocalypse, an effort was made to pierce the future, when time shall be no more.

Races of mankind, extinct or still existing, have passed before us in one long procession, including primeval dwellers in dim prehistoric days—unlettered workers in the ages of stone and bronze—toilers in that of iron, the daily life of whom is fairly familiar from the records which they have left behind. Empire builders of the ancient world, thousands of years before our era, have brought before us a wondrous scene of human enterprise. Races of wide diversity—Egyptians, Assyrians, Babylonians, Indians, Chinese, and aboriginal Americans, have presented groups kaleidoscopic in colour and distinct in type.

The wonderful artistic sway of Greece and the constructive power of Rome have swept past, leaving

footprints never to be obliterated unless the world reverts to so-called Kultur which brooks no competitor past or present. We have watched the dire effects of war upon the arts and sciences before and after Christ. The marvellous effect of the scientific use of steam and electricity upon human life and industry has been traced. We have visited our progenitors in their rock dwelling, almost devoid of clothing and of household goods, and we have companied with our contemporaries, surrounded with every luxury which taste, mechanical skill, and ships from distant climes can bring together. All our vision has been through a telescope of silver.

One thought cannot fail to be impressed upon the reader's mind, and that is the element of change that ever pervades the universe. Ask the geologist, and he will tell you that the earth's crust has always cracked, bulged, and contracted, that the very contour of the landscape varies from year to year, as verdure and weather disintegrate its surface. Ask the physicist, and he will answer that matter, even in apparently solid metals like iron, is in violent and constant motion. Ask the historian, and he will weave you endless narratives of empires which have risen and fallen, of the great who have flourished and gone, and of the common folk, 'the rude forefathers of the hamlet,' who, countless in number, have lived out their simple lives, and mingled their dust with those who had gone before.

The Past, the Present, and the Future is one vast and ever-shifting panorama, and we, poor mortals! who fancy that the show is for our benefit, do but pass away in a night! Well is it for us if we cleave to Him with Whom is no shadow of turning. The inspired utterance of the Hebrew Sage, 'I the Lord change not,' was not addressed to his race alone. The soul of man, his spiritual essence, born to wage constant combat against material forces, was not created to perish like his material envelope, though generation after generation of his fellows may seem to come and go from his ken.

Ever the Refiner waits with unchanging patience, until in the fullness of time, if need be, a seven times

ROUND ASSAY FURNACE.

RECTANGULAR ASSAY FURNACE.

ASSAY FURNACES.

Reproduced from 'AGRICOLA,' Published 1556 *A.D.* (*p. 306.*)

trial in the fire effects that for which He seeks. In other words, until those eternal principles upon which are based His Throne—'Justice and Judgment are the habitation of His Seat'—ensure an End commensurate with His Will in the universe which He made.

Like all else, the relation between silver and mankind has never been constant, and never will be. This fact is manifestly of supreme importance so long as silver is used as a standard of value, that is to say, as money. The two pence—two Roman denarii, together equal perhaps to fifteen pence of English modern money—which the Good Samaritan handed to the inn-keeper as a handsome provision for the wounded wayfarer, would not go far in modern currency to secure comfort for a stranded invalid.

Penned as many of the lines in these pages have been during the solemn days of the greatest war which the world has ever seen, their setting down has caused the writer to realise more clearly than ever that what is commonly called wealth is but a relative term. The waste of human life and property, the assumption by the State of extreme rights over life and property in time of war, have brought well home that the possession of a sound mind in a sound body, and the power to earn, in peace and safety, a competence sufficient to maintain in simple comfort the family circle, is wealth indeed.

Prices are but a relative consideration. If it be desired to estimate the happiness of mankind at different epochs in the world's history, it is necessary to ascertain the relation of wages to the purchasing and not to the nominal value of the currency. Hence Professor Thorold Rogers rightly states: 'It was necessary that I should say as much as I have said in order that we may have light wherewith to follow the fortunes of the English labourer. His guild lands, the benefit societies of the Middle Ages, which systematically relieved destitution, were stolen by the greedy leader of the new aristocracy, he suffered eighteen years' experience of a debased currency, prices rose 150 per cent., and the wages of labour were almost stationary.'

Twenty new-laid eggs in the halcyon days of 1275 A.D. went for a penny, in 1572 A.D. the same number cost 4d. In the winter of 1915, owing to war conditions not so much as currency difficulties, twenty eggs meant an expenditure of 8s. A pullet was worth 1¾d. in 1275 A.D., ¾d. in 1314 A.D., 1½d. in 1335 A.D., 2½d. in 1531 A.D., and 7d. in 1572 A.D. From a modern point of view, a bull in 1305 A.D. could not be described as dear at 7s. 6d. all told. Just nine years after a similar beast cost 24s., but in 1548 A.D. the buyer had to pay 45s.

A sheep, described in the old records as a mutton, cost 1s. 4d. in 1314, 2s. 10d. in 1531, and 4s. 4d. in 1572 A.D. (In periods of severe drought in Australia, sheep have changed hands quite recently at similarly low rates.) Pigeons were 2d. the dozen in 1335, compared with 2s. the dozen in 1572 A.D. Fish in the early days of London's history was very cheap. Old Father Thames had not acquired then that slaty, muddy hue which does not augur well for the health of his tenants. Sea fish, too, commanded but a low price. In 1275 herrings were twenty a penny. Wheat, 2s. a quarter in 1335, rose to 13s. a quarter in 1572. Butter, a halfpenny a pound in 1548, was 3d. a pound in 1572. What is it going to cost?

The prices just quoted were calculated upon the basis of shillings—in other words, silver coin. Although in some cases the variation in prices may have arisen from war necessity, or the incidence of exceptional harvests, good or bad as the case might be, the question of scarcity or abundance of silver was certainly an important factor. Indeed, there can be little doubt that the rise in prices generally during the sixteenth century was connected with silver treasure which Spain was pouring into commerce as the fruit of her discoveries in America.

The sudden increase in the production of gold, following the finds in California, Australia, and Africa, had similar results, though other economic events such as the improvement of communications by sea and the exploitation of less civilised lands, the extension of the use of machinery, and an increase in the world's wealth

and consequent demand for currency, have contributed their quota, one way or the other.

When the basis of currency consists of one metal alone, any variation of its production produces a certain amount of embarrassment, but less than a varying production of two metals, forming a joint basis, would cause. Wherefore the world, practically with the sole exception of China, decided, within the last forty or fifty years, to rest its currency system upon gold alone. The amount of gold produced in excess of that required for the arts and sciences, etc., automatically swells the world's currency, inasmuch as the Bank of England is prepared to pay 77s. 9d. for each standard ounce tendered to it, in other words, to put the gold into circulation as money.

The surplus production of silver cannot now be *forced* into currency, except in China, where silver ingots act as money. The influx into China of currency, however, is regulated by the ability of that country to export goods in exchange, an ability determined by harvests more than anything else, for, as yet, it has not developed manufactures upon a great scale. Had this great nation possessed the means to compete in manufactures with Western countries, the enormous increase in the production of silver arising from the development of mining in the United States of America, Mexico, and Canada, would have created grave fiscal problems and remarkable changes in prices. Fortunately for the world, the people of China are slow to move in new directions, and tied by conventions, otherwise the labour market of the world would have felt heavily ere this the severity of industrial competition with a peace-loving and laborious people, numbered by hundreds of millions.

The variation in the relative value of gold and silver at different epochs is extremely large. Fifteen centuries before Christ an ounce of silver in Arabia was worth ten of gold, so states Agatharchides (who lived 181-145 B.C). In the year 1902 (November 27-28) silver was quoted $21\frac{11}{16}$d. per ounce standard—making over $43\frac{1}{3}$ ounces of silver saleable for one ounce of gold. The extreme

variation is therefore remarkable, being no less than 435 degrees. Although the former of these ratios may be open to doubt, in view of the difficulty which Agatharchides may have had in authenticating his statement, there is little doubt whatever that the relative values of silver and gold in India were 1 to 4 in the latter part of the sixth century B.C. From the fourth century B.C. to about the period of the discovery of America in 1492, the European value of silver measured in gold kept within about a point either side of 12 to 1. From that date the value appears to have increased until it remained fairly stable at about 15½—under the steadying influence of the Latin Union.

With the abandonment of bimetallism the ratio widened with increasing rapidity until in 1909 it stood at its widest point—39·74 to 1. The yearly variation is appended:

1873	15·93	1896	30·59
1874	16·16	1897	34·20
1875	16·64	1898	35·03
1876	17·75	1899	34·36
1877	17·20	1900	33·33
1878	17·92	1901	34·68
1879	18·39	1902	39·15
1880	18·05	1903	38·10
1881	18·25	1904	35·70
1882	18·20	1905	33·87
1883	18·64	1906	30·54
1884	18·61	1907	31·24
1885	19·41	1908	38·64
1886	20·78	1909	39·74
1887	21·10	1910	38·22
1888	22·00	1911	38·33
1889	22·10	1912	33·62
1890	19·75	1913	34·19
1891	20·92	1914	37·49
1892	23·72	1915	39·75
1893	26·49	1916	30·07
1894	32.56	1917	23·03
1895	31·60	1918	19·79

These figures, based on gold at 77s. 9d. per standard ounce, are conclusive evidence of the effect of the pro-

duction of silver upon its price, and how uncertain is its action for measuring the value of commodities.

Prices have much to do with the common weal. The era and cult of cheapness ushered in by the substitution of machinery for individual manufacture has robbed the artisan, to a large extent, of joy and pride in his handiwork. It was also one of the underlying causes of the Great War, by luring Germany to over-production and to seize upon war as the only way out. Progress—so called—had ceased to be the servant of man, and had proved to be his master. The rule of the spiritual had been usurped by the material, until the touchstone of a world's agony distinguished what was precious from what was base.

Whatsoever may be the future production of gold, that of silver is well assured for many years to come, especially provided that Mexico can obtain the blessing of a settled government. Its silver treasures are barely trenched upon. The extension of railway facilities, which would certainly attend internal peace, would carry mining industry to many districts, rich in metals, hardly touched at all. With the exception, however, of certain mines in Mexico and those in the Cobalt minefield in Ontario, silver is produced mainly as a by-product from ores rich in the base metals. Hence, demand for these metals will have an important, almost a decisive influence, upon the future production of silver.

Silver, however, possesses so many useful and ornamental qualities, and has acquired such a fast hold upon the economy of man, that, whether it be relegated to a coinage position entirely subsidiary to gold or even be superseded in currency systems by nickel or other base metals, the world will always find an industrial utility for as much silver as is ever likely to come into the market.

APPENDIX

Monetary stocks of the principal countries of the world—End of calendar year 1918.

[STATED IN UNITED STATES DOLLARS.]

Country.	Monetary standard.	Monetary Unit.	Metallic stock, unclassified.	Gold stock.			Silver stock.	Paper circulation.	Population.	Per capita.			
				In banks and public treasuries.	In circulation.	Total.				Unclassified metal.	Gold.	Silver.	Paper.
			Thousands.	*Thousands.*	*Thousands.*	*Thousands.*	*Thousands.*	*Thousands.*	*Thousands.*				
			$	$	$	$	$	$		$	$	$	$
North America :													
United States... ...	Gold	Dollar	...	3,165,226	...	3,165,226	656,137	[1]3,865,352	105,015	...	30.14	6.25	36.81
Canada...	do.	do.	60,927	130,900	...	130,900	...	[4]224,501	8,075	7.55	16.21	...	27.80
Mexico	do.	Peso	250,000	...	...	...	...	...	15,502	16.13	...	...	...
British Honduras ...	do.	Dollar	...	3	...	3	165	481	41	...	.07	4.02	11.73
Costa Rica	do.	Colon	...	1,415	...	1,415	697	6,409	431	...	3.28	1.62	14.87
Dominican Republic...	do.	Dollar	...	100	300	400	400	1,400	725	...	.55	.55	1.95
Guatemala	Silver	Peso	...	...	...	...	...	240,000	2,119	...	...	...	113.26
Haiti	Gold	Gourde	...	500	200	700	150	...	2,500	...	.28	.06	...
Honduras	Silver	Peso	...	...	...	...	...	1,000	562	...	...	...	1.78
Nicaragua	Gold	Cordoba	...	...	...	...	...	2,960	704	...	...	...	4.20
Salvador	Silver	Peso	...	757	...	757	3,621	12,009	1,268	...	.60	2.86	9.47
South America :													
Argentina	Gold	do.	...	321,869	...	321,869	...	500,757	8,066	...	39.90	...	62.08
Bolivia...	do.	Boliviano	...	...	...	...	...	13,684	2,890	...	...	...	4.73
Brazil	do.	Milreis	...	27,301	...	27,301	16,389	551,509	26,542	...	1.02	.62	20.78
Chile	do.	Peso	...	...	4,702	4,702	6,661	...	3,641	...	1.29	1.83	...
Colombia	do.	Dollar	...	4,519	...	4,519	6,249	9,908	5,071	...	.89	1.23	1.95
Ecuador	do.	Sucre	...	3,713	...	3,713	427	5,790	2,000	...	1.85	.21	2.90
Paraguay	do.	Peso	...	...	482	482	...	120,599	1,000	...	.48	...	120.60
Peru	do.	Libra	...	15,669	16,598	32,267	424	24,862	5,800	...	5.56	.07	4.29
Uruguay	do.	Peso	...	51,094	...	51,094	...	...	1,346	...	37.96	...	...
Venezuela	do.	Bolivar	...	6,866	5,272	12,138	9,508	4,345	2,816	...	4.31	3.38	1.54
Europe :													
Austria-Hungary ...	do.	Krone	...	53,186	...	53,186	11,548	8,713,016	52,368	...	1.02	.23	166.38
Belgium[2]	do.	Franc	...	51,346	...	51,346	5,460	906,367	7,658	...	6.70	.71	118.35
Bulgaria	do.	Lev	...	...	...	...	...	...	...	...	...	...	...
Denmark	do.	Krone	...	51,992	...	51,992	657	120,000	2,921	...	17.80	.22	41.08
Finland	do.	Markka	...	...	...	...	...	223,147	3,269	...	...	...	68.26

France	do.	Franc	...	664,017	...	664,017	61,432	5,838,173	39,700	...	16.73	1.55	147.06
Germany	do.	Mark	...	719,558	...	719,558	4,764	9,093,047	67,810	...	7.95	.07	134.10
Great Britain... ...	do.	Pound	3,003	595,462	...	595,462	...	2,188,134	46,089	.07	15.61	..	47.48
Italy	do.	Lira	...	234,109	...	234,109	15,028	2,677,682	36,546	...	6·41	.41	73.27
Luxembourg	do.	Franc	...	125	483	608	1,255	[5]63,796	260	...	2.34	4.83	245.37
Netherlands	do.	Guilder	...	277,957	...	277,957	49,665	470,536	6,583	...	42.22	7.54	71.48
Norway	do.	Krone	...	38,747	...	38,747	6,164	116,902	2,509	...	15.44	2.45	46.59
Portugal	do.	Escudo	...	8,608	...	8,608	40,646	...	5,958	...	1.44	6.82	...
Roumania[2]	do.	Leu	...	1	..	1	37	480,405	7,508	...	...	...	158.93
Russia	do.	Ruble	411,600	...	...	...	...	28,432,814	178,905	2.30	...	...	...
Serbia	do.	Dinar	...	13,703	5,790	19,493	13,993	...	4,622	...	4.22	3.03	63.99
Spain	do.	Peseta	...	438,562	...	438,562	220,289	645,536	20,500	...	21.39	10.75	31.49
Sweden...	do.	Krona	...	76,574	...	76,574	12,282	220,194	5,713	...	13.40	2.15	38.54
Switzerland	do.	Franc	...	80,730	...	80,730	40,553	189,930	3,880	...	20.81	10.45	48.95
Turkey...	do.	Pound	...	...	...	...	...	703,530	21,274	...	...	...	33.07
Asia :													
Ceylon	do.	Rupee	...	835	..	835	4,941	17,951	4,262	...	.20	1.16	4.13
China[6]...	Silver	Tael, Dollar	...	...	...	...	31,358	...	336,042	...	...	.09	...
Chosen (Korea)[2] ...	Gold	Yen	24,889	...	...	...	...	57,589	16,913	1.41	...	...	3.41
Formosa (Taiwan)[2] ...	do.	do.	34,092	...	...	...	...	20,492	3,711	9.19	...	...	5.52
India[7]	do.	Rupee	...	64,489	...	64,489	111,145	477,157	315,156	...	.20	.35	1.51
Japan	do.	Yen	...	368,009	23,390	391,399	91,247	666,061	55,965	...	6.99	1.63	11.90
Netherland Indies[2] ...	do.	Guilder	...	43,423	...	43,423	5,779	79,449	47,956	...	.91	.12	1.66
Persia	Silver	Kran	...	...	...	...	...	...	...	...	...	...	...
Siam	Gold	Tical	...	...	...	...	41,532	35,891	8,266	...	...	5.02	4.34
Straits Settlement	do.	Dollar	...	1,629	...	1,629	15,634	64,995	714	...	2.28	21.90	91.03
Africa :													
Belgian Congo ...	do.	Franc	...	...	...	...	...	...	...	...	...	...	...
Egypt	do.	Egyptian pound	...	3,821	...	3,821	35,555	234,551	12,566	...	.30	2.83	18.67
Morocco, French ...	do.	Peseta	...	...	...	...	24,638	860	5,000	...	...	4.93	.17
South Africa	do.	Pound sterling	...	[5]33,313	...	33,313	30	30,506	6,465	...	5.15	...	4.71
Australasia	do.	do.	...	246,422	...	246,422	...	588,467	5,976	...	41.24	...	98.47
TOTAL	...	...	783,511	7,739,896	57,217	7,797,113	1,546,460	68,942,384	1,529,179	·51	5.10	1.01	45.08

[1] Gold and silver certificates not included, as they represent those metals, dollar for dollar.
[2] State bank figures only.
[3] Does not include metallic reserve in Government Treasury.
[4] Bank notes only.
[5] All except $4,246,000 are German marks.
[6] Shanghai stock only.
[7] Government Currency Department only.

NOTE—Figures given represent each country's stock at the end of the year, except where otherwise indicated. Population figures are from the Statistical Abstract of the United States, 1917. Blanks indicate no figures available, rather than no stock. Gold held abroad, as follows, not included in above figures: Argentina, $96,062,428; British Honduras, $250,000; Ecuador, $4,986,545; Egypt, $15,831,811; France, $393,160,300; Haiti, $500,000; Straits Settlements, $21,479,267.

COINAGE OF NATIONS.

CALENDAR YEAR 1915.

Country.	Monetary unit.	Gold.		Silver.		
		Unit value of countries' money.	Value in United States money.	Unit value of countries' money.	Value of fine ounces consumed.[1]	Fine ounces consumed.
United States	Dollar	23,968,401	$23,968,401	4,114,082	$1,544,318	2,976,024
Philippine Islands	Peso	...	...	176,000	44,044	84,876
Abyssinia	Talari	...	...	35,000	13,689	26,379
Austria-Hungary	Crown	6,672,615	1,351,861	56,659,318	3,946,474	7,605,168
Brazil	Milreis	43,140	23,563	...	...	...
British Empire:						
Australasia	Pound	7,934,376	38,612,640	191,300	333,902	643,456
British West Africa	do.	...	...	16,275	28,429	54,784
Canada	Dollar	...	...	184,549	66,438	128,031
Great Britain	Pound	21,316,653	103,737,492	7,715,437	13,466,810	25,951,612
India	Rupee	...	...	17,225,422	3,072,649	5,921,239
New South Wales	Pound	1,792,000	8,720,768	...	...	...
Bulgaria	Leva	...	...	6,000,000	417,922	805,370
Chile	Peso	1,305,720	476,588	6,306,048	681,732	681,732
China	Dollar	...	...	141,931,233	57,233,989	110,294,436
Costa Rica	Colon	10,000	4,654	...	...	...
Cuba	Peso	5,618,000	5,618,000	5,181,205	1,996,225	3,846,883
Denmark	Kroner	10,649,040	2,853,943	2,930,819	293,374	565,355
Dutch East Indies	Florin	...	...	3,465,000	529,424	1,020,243
Ecuador	Sucre	...	...	31,468	11,812	22,762
Egypt	Pound	...	...	695,400	1,353,499	2,608,300
France	Franc	...	...	86,328,362	6,013,002	11,587,532
French colonies:						
French Morocco	Rial	...	...	1,154,351	433,313	835,029
Tunis	Franc	1,290	249	2,230,124	155,334	299,341
Germany	Mark	25,361,100	6,041,014	42,749,377	3,565,999	6,871,962
Italy	Lira	...	...	18,240,456	1,270,497	2,448,348
Italian Somaliland	Rupee	...	...	275,000	49,054	94,530
Liechtenstein	Crown	...	...	200,038	13,933	26,850
Japan	Yen	30,260,000	15,084,610	2,690,884	727,263	1,401,493
Netherlands	Florin	...	...	15,715,000	477,579	4,774,492
Norway	Crown	...	...	1,644,100	164,574	317,147
Persia	Kran	1,394,212	109,027	12,308,443	850,683	1,639,333
Peru	Libra	91,984	447,640	2,022,077	759,035	1,462,720
Portugal	Escudo	...	...	2,540,000	884,589	1,704,673
Russia	Ruble	...	...	38,400,600	11,529,162	22,217,611
Serbia	Dinar	...	...	16,684,710	1,162,135	2,239,526
Siam	Tical	...	...	6,761,000	1,522,741	2,934,443
Sweden	Crown	...	...	1,882,581	188,445	363,149
Switzerland	Franc	19,000,000	3,667,000	200,000	13,930	26,845
Turkey	Piaster	3,002,296	13,210,105	100,000	1,669	3,217
Total	...	...	223,927,555	...	116,817,667	225,116,911

[1] At average United States equivalent value of a fine ounce of silver in London $0.51892 in 1915, $1,313,752.

COINAGE OF NATIONS—*continued.*

CALENDAR YEAR 1917.

Country.	Monetary unit.	Gold.		Silver.		
		Unit value of countries' money.	Value in United States money.	Unit value of countries' money.	Value of fine ounces consumed.[1]	Fine ounces consumed.
United States	Dollar ...	10,014	$10,014	29,412,300	$19,047,448	21,276,122
Philippine Islands ...	Peso ...	...	...	1,566,431	721,367	805,772
Argentina	do. ...	...	...	62,320	40,358	45,080
Belgium	Crown ...	...	...	8,540,000	1,026,218	1,146,292
Brazil	Milreis ...	45,380	24,791	...	...	...
British Empire:						
Australasia	Pound ...	4,110,286	20,002,706	...	...	...
British Guiana ...	do. ...	...	...	1,200	3,613	4,036
British West Africa .	do. ...	...	...	961,800	2,896,229	3,235,106
Canada	Dollar ...	297,207	297,207	1,951,168	1,211,831	1,353,623
Ceylon	Rupee ...	...	...	1,134,420	349,109	389,957
Great Britain ...	Pound ...	1,014,714	4,939,106	4,088,777	12,312,367	13,752,993
India	Rupee ...	9,112,500	2,956,399	278,776,176	85,791,191	95,829,310
Newfoundland ...	Dollar ...	...	...	240,000	148,499	165,875
Straits Settlement	do. ...	...	...	690,335	361,542	403,845
China	do. ...	...	...	48,650,983	33,846,329	37,806,567
Columbia	do. ...	...	...	120,465	78,013	87,141
Costa Rica	Colon ...	...	...	14,664	7,597	8,486
Denmark	Kroner ...	15,024,400	4,026,539	739,905	127,776	142,727
Dutch East Indies ...	Florin ...	60	24	130,258	34,468	38,501
Egypt	Pound ...	377 000	1,863,511	1,171,400	393,347	439,371
France	Franc ...	...	...	86,453,725	10,388,802	11,604,359
French colonies:						
French Morocco ...	Rial ...	...	...	14,200,000	9,195,942	10,271,925
Italy	Lira ...	...	...	21,979,328	2,641,169	2,950,203
Japan	Yen ...	119,937,880	59,777,039	128,962,274	60,131,634	67,167,421
Mexico	Peso ...	36,705,000	18,297,442	18,556,000	13,052,376	14,579,588
Netherlands	Florin ...	41,247,129	16,577,221	...	...	...
Norway	Crown ...	...	...	2,352,000	406,175	453,700
Siam	Tical ...	...	...	14,611,000	567,726	634,154
Uruguay	Peso ...	...	...	2,771,293	1,794,693	2,004,684
Total	...	...	128,771,999	...	256,575,819	286,596,805

[1] At average United States equivalent value of a fine ounce of silver in London, $0.89525 in 1917, and at average price of a fine ounce of silver in New York, $0.98446 in 1918.

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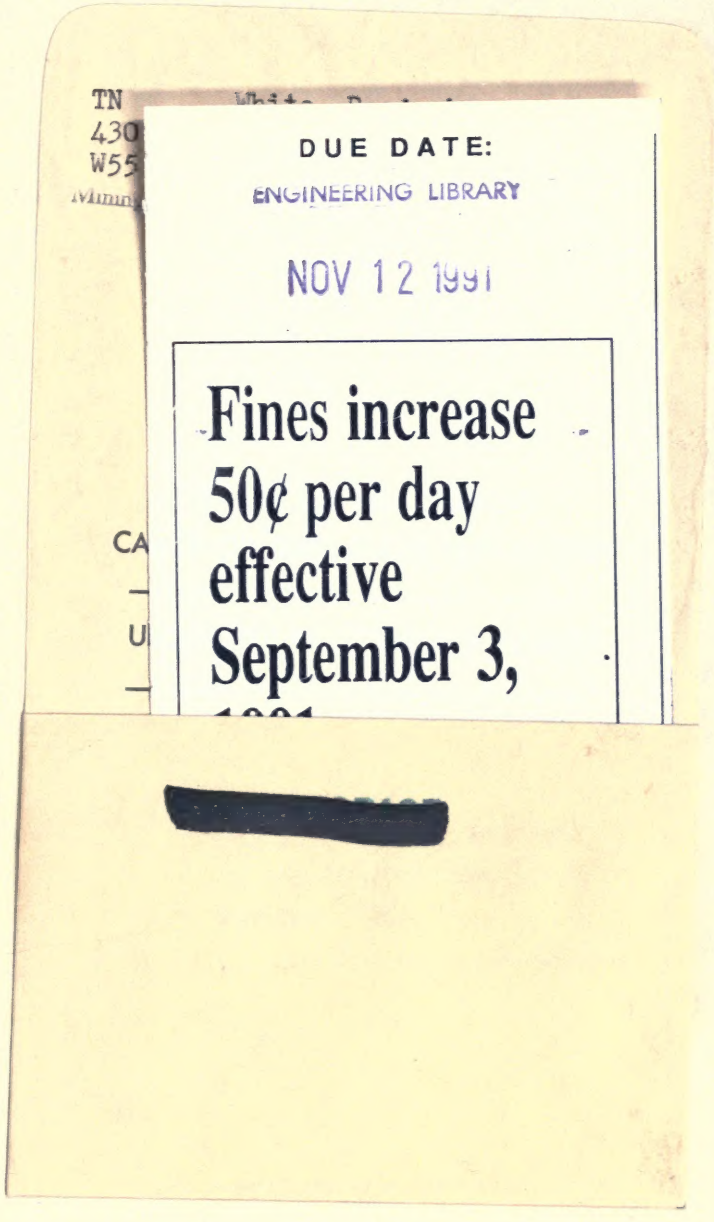
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